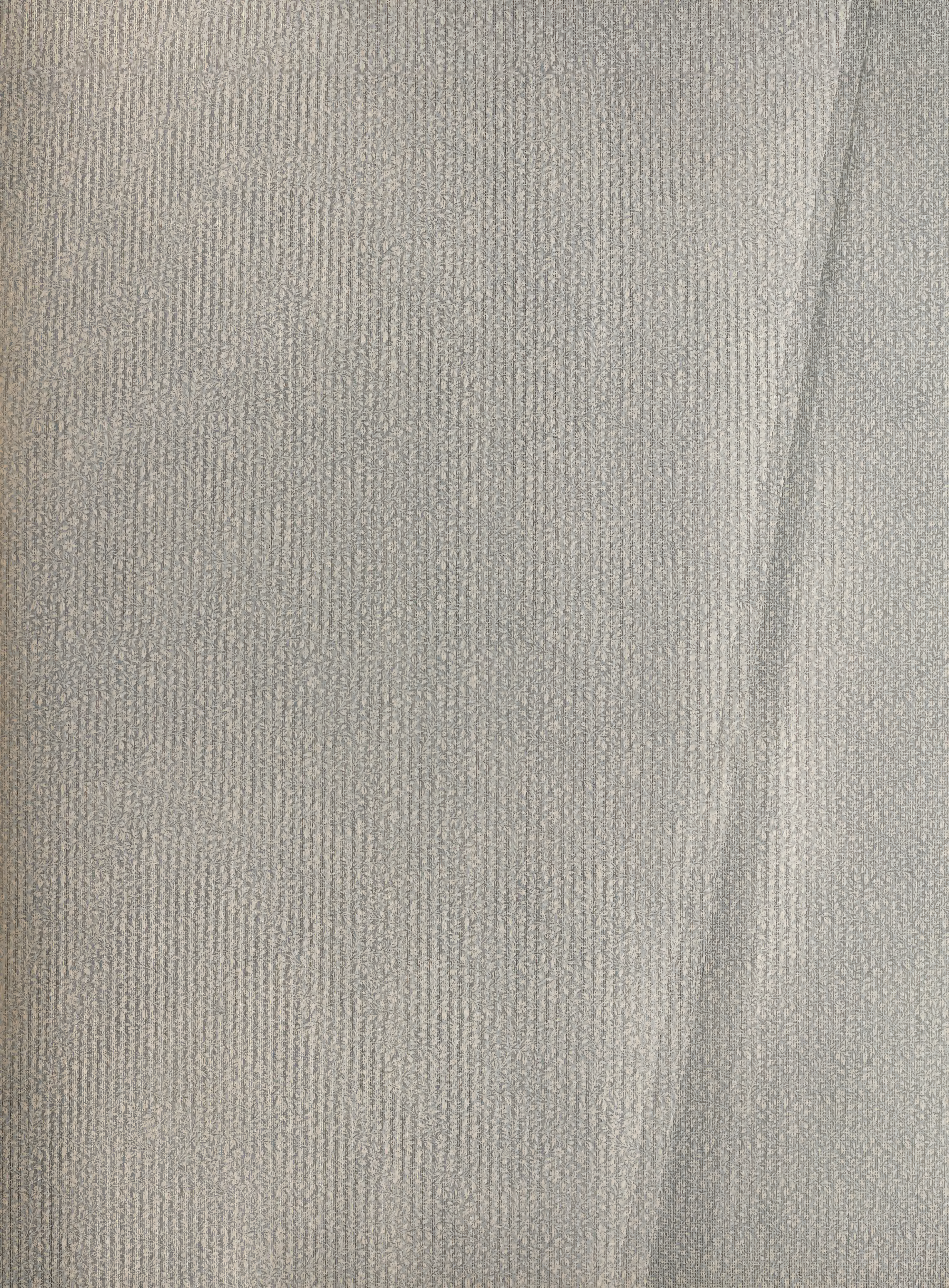


Section

Four



Authors Edition







JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST

journalists there are 600, of authors known to fame about half that number, while more than 200 are practising lawyers or architects. But most remarkable of all is the number engaged in farming, planting, and stock-raising, in which pursuits no less than 50,000 women are represented. Such is the part that woman plays in the great workshop of our western republic, as, with the lapse of years, she rises slowly but surely toward the higher plane of her destiny.

One by one the disqualifications of women have been laid aside, their legal rights asserted, and acknowledged, so that in many of the states they share nearly all the political privileges and civic duties pertaining to citizenship. In Wyoming, Washington, and Utah women may vote and serve on juries; in Kansas there are municipalities where the office of mayor has been filled by women; in Pennsylvania they may be appointed masters in equity, and in New York, Massachusetts, Connecticut, and in several of the western states as notaries public, commissioners of deeds, administrators, and executors. By the general government they may be commissioned as post-mistresses, army surgeons, captains of steamboats, and even as United States marshals. With some exceptions, our leading universities have not been slow to recognize the claims of women to such opportunities for higher and special branches of education as are accorded to men. At many of the law schools, the schools of medicine, surgery, dentistry, music, and the fine arts, women are trained and graduated, one department only closing its doors against them, and that is the department of theology. Thus, it will be seen that women can no longer be excluded on the ground of mental inferiority, and those who would advocate such exclusion must do so on other grounds.

"Women," says Ariosto, "have risen to high excellence in every art whereto they have given their care." And never since these words were written has been presented, until this year of 1893, a complete exposition of what woman has done, and is doing in the great workshop of the world. Here is in truth a complete and life-like representation of woman's condition among all the nations of earth, one relating especially to the great army of wage earners, many of whom labor under adverse conditions, their task injurious to health, and their daily pittance barely sufficing for their daily bread. But here is also shown how women may find more congenial and profitable sources of employment, may learn how best to prepare themselves for new opportunities, and how to take advantage of them, each one according to her ability.

Of all the lessons of the Exposition there are none that will be longer remembered than those which the Woman's department has taught us, and to none is more credit due than to the Board of Lady Managers, forming, with its associated boards, an organization of women for the common benefit of woman-kind such as has never before existed in the history of the world. Theirs was the hardest task of all, and never perhaps was success more hardly won; never were the barriers of prejudice and apathy more difficult to overcome.



SEPTEMBER OCTOBER NOVEMBER DECEMBER

THE MONTHS, DEPICTED ON SATIN IN THE FRENCH SECTION

From oriental countries especially came most discouraging reports; for there were neither schools nor women with intelligence equal to the work. Many European countries were at first indifferent though later responding nobly to the invitation. Says the president of the Board: "We travelled together a hitherto untrodden path; we were subjected to tedious delays; and overshadowed with dark clouds which threatened disaster to our enterprise. We were obliged to march with peace offerings in our hands, lest hostile motives should be ascribed to us. When our invitations were sent to foreign lands, the commissioners already appointed generally smiled doubtfully, and explained that their women were doing nothing; that they would not feel inclined to help us, and in many cases stated that it was not the custom of their country for women to take part in any public effort."

But to the women of every land, to women who have near at heart the cause of their sex, who would not merely live a life of ease without a thought for their less fortunate sisters, personal letters were addressed soliciting their coöperation, and with most favorable results. Then it was that what had been merely a hope began to assume reality, and, continues the president, "our burdens were greatly lightened by the spontaneous sympathy and aid which have reached us from women in every part of the world, and which have proved an added incentive and inspiration." When first the Woman's building was designed, the managers were somewhat doubtful as to filling its space with creditable exhibits; but long before it was opened applications were made for four or five times the available room, thus permitting a selection of the choicest and most attractive specimens of female work. Most fitting it is that the best of these specimens, including the Woman's library, should find a permanent home in a memorial building, there to serve as a nucleus for still more valuable collections.



SEAL OF BALTIMORE

WORLD'S FAIR MISCELLANY.—Adjoining the western vestibule of the Woman's building is a bureau where women are specially employed to furnish information or to act as guides through the grounds and buildings, and, if desired, through the city. The parlors and reception rooms were arranged and furnished with a view to the comfort and convenience of visitors, all of whom are permitted to use them free of expense.

In the rotunda of the Administration hall is a model of the treasury building at Washington, constructed of souvenir half dollars, twenty feet long, eleven in width, and four in height, placed there since the foregoing part of this work was put in print.

The correspondence maintained by the Board of Lady Managers was second only in bulk to that of the department of Publicity and Promotion, and included in its scope all social, charitable, reformatory, educational, literary, and art associations, together with

women's exchanges, unions, and alliances of whatever description, throughout the United States, and in many foreign lands.

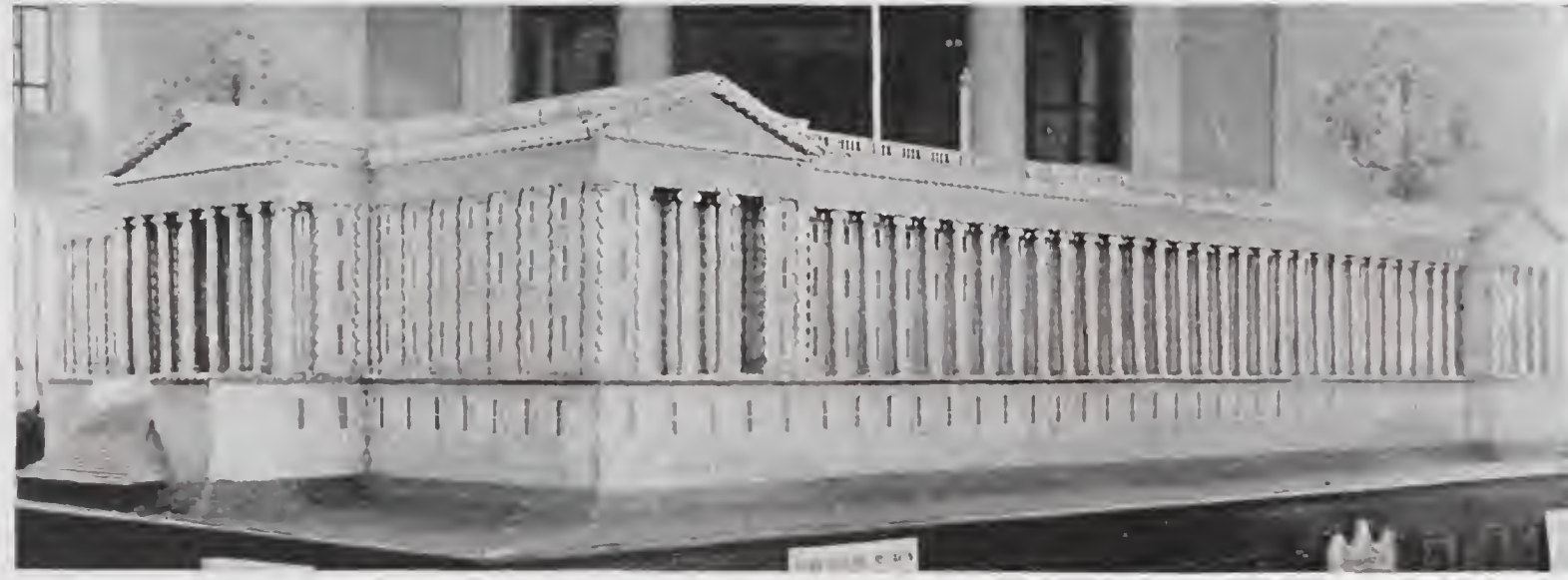
It was early determined that awards in the shape of medals or certificates should be made by juries or examining boards, in token of merit only, and as an acknowledgment of progress in the art or craft represented in the exhibits.

For the sale of exhibits by individuals, woman's exchanges, educational unions, and decorative art societies, a coöperative system was arranged, each association or individual paying its

proportion of the expenses. Twenty per cent is charged on all sales effected by employes of the management. None of the articles sold could be removed until the close of the Exposition except through concession granted by the committee on ways and means, and all articles admitted for sale must either represent the original work of exhibitors or such as their work had largely increased in value.

The so-called golden nail, driven home by Mrs Potter Palmer at the dedication ceremonies, was made of pure copper, silver and gold. It was designed as the cross-bar of a brooch fashioned in the form of a shield representing Montana's state seal and coat of arms. In the foreground is a waterfall, behind which is a range of mountains wrought in copper, and encircled by a sunset effect in gold. The brooch is enclosed in a band of gold, with a farmer and prospector on either side, the former grasping a golden rake, and the latter a golden pick. In the centre, between these figures, is a Montana sapphire, appearing like a star in the sky depicted beneath. At the conclusion of the ceremonies the nail was withdrawn, returned to its place behind the brooch, and both were presented to Mrs Palmer. The hammer used on this occasion was a handsome piece of workmanship furnished by the women of Nebraska.

Forty thousand souvenir coins, with a face value of a



MODEL IN SOUVENIR COINS OF THE U. S. TREASURY BUILDING



HARRIOT'S HISTORY OF ROANOKE ISLAND

quarter of a dollar, were issued from the government mint for the use of the Board of Lady Managers. On one side is a woman with a distaff, the figure encircled by the inscription, Board of Lady Managers, Columbian Quarter; on the reverse side a profile of Queen Isabella, after whom the coin was named.

At a meeting of the Board of Lady Managers, on July 31, 1893, it was resolved to establish a building fund for the erection of a permanent structure commemorative of the work of woman at the World's Fair. It was agreed to reserve as a nucleus for the fund the premium realized from the sale of the Isabella souvenir coins, amounting to \$30,000, and to this sum Mrs Potter Palmer added her salary, amounting to some \$9,000.

Affixed to all the official documents of the New York Board of Lady Managers is a seal which recalls an oft-told tale in connection with the Columbian discovery, yet one which women love to repeat.

laundry work and pure soaps, with a collection of books containing information as to the various branches of domestic and industrial work.

Kate Marsden, the English nurse of the Red Cross society, whose work among the lepers of Siberia, as elsewhere noticed, attracted so much attention, made a journey of many thousand miles by cart, sledge, boat, and on horseback, to find a certain herb said to be a specific for leprosy. On reaching the district where it grew, she found it to be of no value. The book describing her experience, and entitled *On Sledge and Horseback to Outcast Siberian Lepers*, created a sensation when published in London. Princess Christian presented Miss Marsden with the badge of the Royal British Nurses' association, and she was elected a fellow of the Royal Geographical society.

Mrs French-Sheldon, whose African expedition is mentioned in the text, travelled through the dark continent with a caravan organized and equipped at her own expense. She was unattended,



CHILDREN'S BUILDING

The design represents an Indian woman standing upon a rocky shore, gazing anxiously seaward, and waving a torch high above her head, thus idealizing the story that the light which Columbus saw was the signal with which an Español spouse beckoned homeward her belated lord.

The collection of antique and other laces in the Italian section is one of special interest, representing, as it does, a history of the art of lace-making from its earliest inception. This forms one of the most valuable collections extant, many of the specimens being worth from \$12 to \$80 a yard according to width and pattern. There are also copies of historic laces, including some of the queen's laces, one of them presented to her niece, the Princess Letitia Buonaparte, on the occasion of her marriage to a younger brother of the king.

Worthy of note in the educational section is an exhibit by the Pratt institute, of Brooklyn, including rugs, draperies, portieres, wall-papers, and silver-ware, designed by its graduates, and manufactured by various establishments. Wood-carvings and costumes for women and infants were supplemented by various illustrations of the practical application of domestic science. Tests are given for detecting the presence of arsenic in paper-hangings, and upholstery, and of deleterious substances in baking powders, and washing fluids. Then there are charts of a model kitchen, and specimens of fine

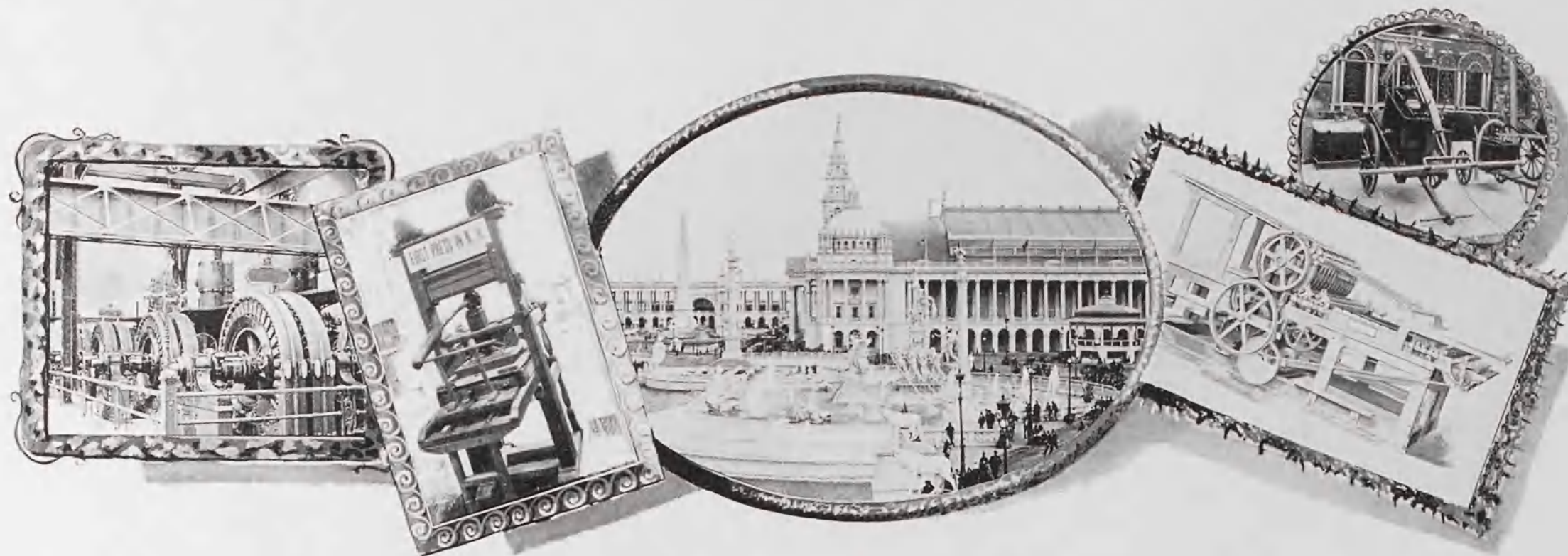
as I have said, by any of her sex, her party consisting of 200 porters, who carried the provisions and outfit, with presents for distribution among the tribes. The palanquin in which she lived and wrote is displayed in the Transportation building, and most of the curios collected during the journey are in the ethnological section of the Woman's department.



THE HAMMER AND LAST NAIL



PALACE OF MECHANIC ARTS



CHAPTER THE TWELFTH

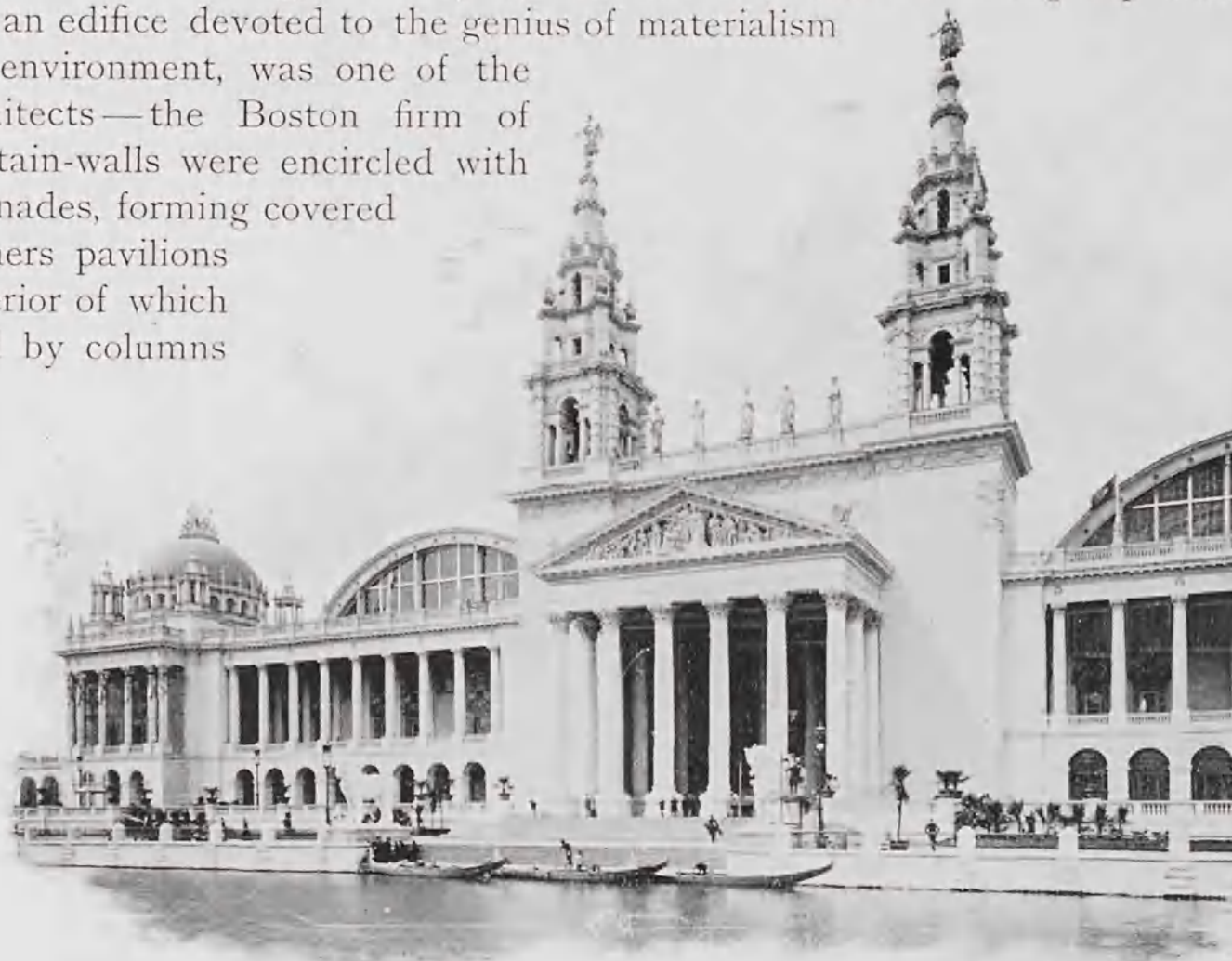
MACHINERY



SOUTH of the Administration building, fronting 350 feet on the main avenue, and with a depth of 500 feet, is the Palace of Mechanic Arts, or as it is more commonly termed Machinery hall, covering, with its annex, more than seventeen acres. While less than one third the size of the Manufactures building, this edifice, apart from its annex, has more than double the dimensions of the national capitol, or of the parliament houses at Westminster. The three main interior divisions resemble somewhat as many railroad sheds placed side by side, each with a conical roof 100 feet in height, supported by arched trusses 50 feet apart. Around this triple hall is a gallery 50 feet wide, and through its centre runs a transept, 130 feet in width. The internal arrangement is admirably suited to the purpose, with a structural design so simple as in a measure to dispel the sense of perplexity caused by a vast display of machinery in motion.

For a building intended for such purposes the foundations must be especially solid. To support the machinery the heaviest and most massive substructures were laid at brief intervals, each of the iron trusses that support the roof resting on huge wooden blocks placed cross-wise, bolted, and supported by poles. The entire edifice rests on a foundation of planking and trestle work, its frame being mainly of wood, while the trusses are of such width that, after serving the purpose for which they were fashioned, they may be used in the construction of railroad sheds.

How to give to this prosaic structure an exterior design in keeping with the remainder of the group that surrounds the great quadrangle, to impart to an edifice devoted to the genius of materialism an air of beauty and harmony befitting its environment, was one of the many problems which confronted its architects—the Boston firm of Peabody and Stearns. First of all, the curtain-walls were encircled with two-storied porticos and with Corinthian colonnades, forming covered walks around the four sides. At the corners pavilions were formed, each 50 feet square, in the interior of which were placed large double stairways inclosed by columns supporting an interior dome. Above this is a large exterior dome, resting on a circular podium, and at its top a lantern. In the centre the main façades are broken by a plain wall surface, carried to a greater height, and finished with a level cornice. On either side of this surface are towers, also accessible by staircases, and above them turrets built in stories and of octagonal shape, each of the topmost stories being almost spiral in shape, and crowning a loftier monument than that on Bunker hill. Between the towers are intermediate pavilions, the one facing the main court



SECTION OF MACHINERY HALL



ENTRANCE MACHINERY BUILDING

containing a portico with semi-circular entrance way of the Corinthian order, crowned with a low half-dome, and with a statue over each of the columns.

Says one of the artificers of the Fair, in commenting on the design: "The long level sky-lines of these great façades, thus broadly accentuated at the corners by domes, and in the centre by the aspiring lines of twin towers nearly 200 feet high, were devised to form an engrossing foreground to the long higher roofs of the triple naves behind, broken by masses of decorative skylights and by the three low conical roofs of the main central transept. On the shorter front these naves present their glazed circular ends behind and above the façade in the manner used in the great Roman baths. In this way every principal feature of the main structure is made to play a noble and expressive part in the decorative scheme. The details of this design have been kept in rigid conformity with classical and scholarly traditions, relieved in parts by motives suggested by the highly ornate renaissance of Spain. Enriched profusely with sculpture and emblematic statues, and with effects of decorative color behind the open screen of the porticos, this composition, if it does not succeed in revealing the mysterious relationships between machinery and art, may at least stand as a beautiful model of highly organized academic design devoted to modern uses."

Over the eastern doorway Columbia sits enthroned, in her right hand a sword, and in her left the olive branch of peace. Near her stands Honor, holding a laurel wreath, and from the steps of the throne Wealth is scattering flowers and fruits from a horn of plenty. On either side inventors and mechanics are submitting their work to judges selected from many nations. At the corners of the main pediment are lions, typical of brute force, subdued by two young children, symbolic of human genius. Above them is a group representing Science and the Four Elements, this being repeated over the northern entrance way, and beneath it, figures bearing escutcheons, on which are portraits of prominent inventors.

To the visitor whose tastes incline to mechanics the Machinery department is one of the most attractive features of the Exposition. That both as to size and quality the display is worthy of the occasion we have sufficient evidence in its many acres of exhibiting space, covered with specimens culled from old and new world centres of industry, the American manufacturer vying with the European, and each country striving to demonstrate that its artificers are among the foremost of their craft.



STATUARY ON THE COLONNADE



COLUMBUS STATUE, NORTH ENTRANCE



THE LOGGIA, MACHINERY HALL

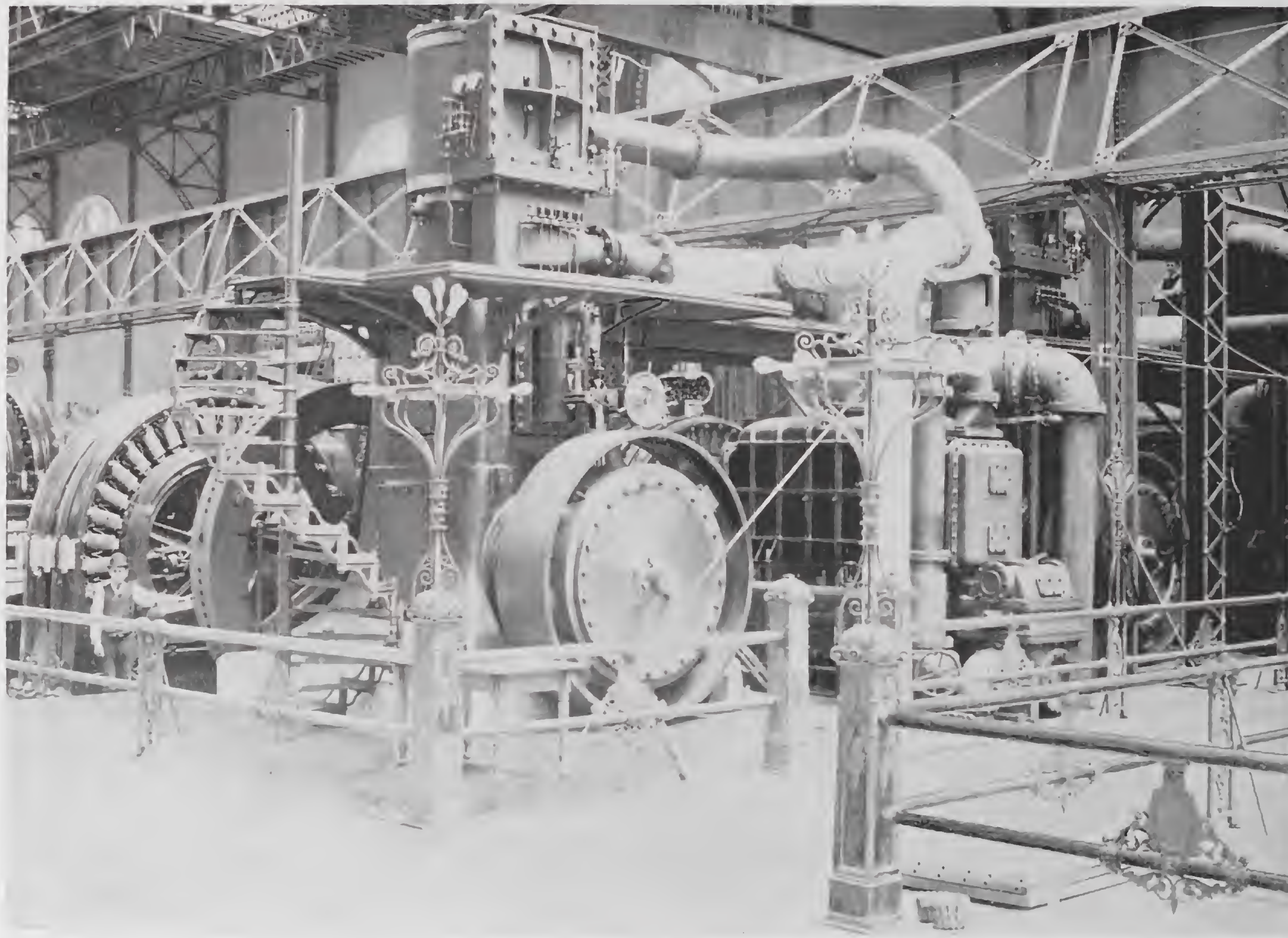


CENTRAL AISLE, MACHINERY HALL

In 79 groups and nearly 200 classes of exhibits is here represented almost every mechanical device fashioned by the ingenuity of man. There is machinery for the transmission of power, whether by electric, steam, hydraulic, or pneumatic apparatus; there are machinery and appliances for the manufacture of textile fabrics, for the preparation of various articles of food, for type-setting, printing, binding, stamping, embossing, and other branches of book and newspaper work; there are machines, apparatus, and tools for lithography, color printing, photo-mechanical and other mechanical processes of illustrating; for working metals, minerals, and woods. Finally there is a collection of fire engines and fire extinguishing appliances, whether by water or chemical apparatus, with machines and implements for many miscellaneous purposes, from shaping the head of a pin or the eye of a needle to the construction of a watch.

In the sections occupied by the United States is a complete illustration of the inventive skill of her mechanics, who within the last half century have revolutionized many branches of industry, and created many new ones. In all these inventions the tendency has been to increase the quantity and improve the quality of products, while dispensing as far as possible with manual labor and rendering processes more and more automatic. Thus it is that the value of production per capita of the operatives employed has more than doubled within forty years, and even within the last decade shows a considerable addition. This has been accomplished not only without detriment, but with material benefit to the wage-worker, whose average earnings have increased more than forty per cent since 1850, and with a three or four-fold gain in the number employed.

Of the twenty or more branches of manufacture whose output exceeds \$10,000,000, by far the largest is that of iron and steel, the value of which, including the unwrought metal and the machinery and apparatus into which it is made or partly made, is probably not less than \$1,200,000,000. Of this amount perhaps \$400,000,000 represents the value of iron and steel, \$500,000,000 of machinery and manufactures, and the remainder that of railroad tracks, rolling stock, and agricultural and other implements and appliances constructed partially of steel or iron. Under the stimulus imparted by improved machinery, whereby many articles are produced at little more than in former years would have been the cost of the raw material, the total value of all manufactures has increased more than seven-fold within two-score of years, affording employment or support to about one-fourth of the entire population of the United States. Such is the good work that machinery has wrought, since, in the later colonial period, it ceased to be regarded as a special invention of the devil, since the days for instance when Thomas Barnard preached before a Boston society for the encouragement of



WESTINGHOUSE ENGINE

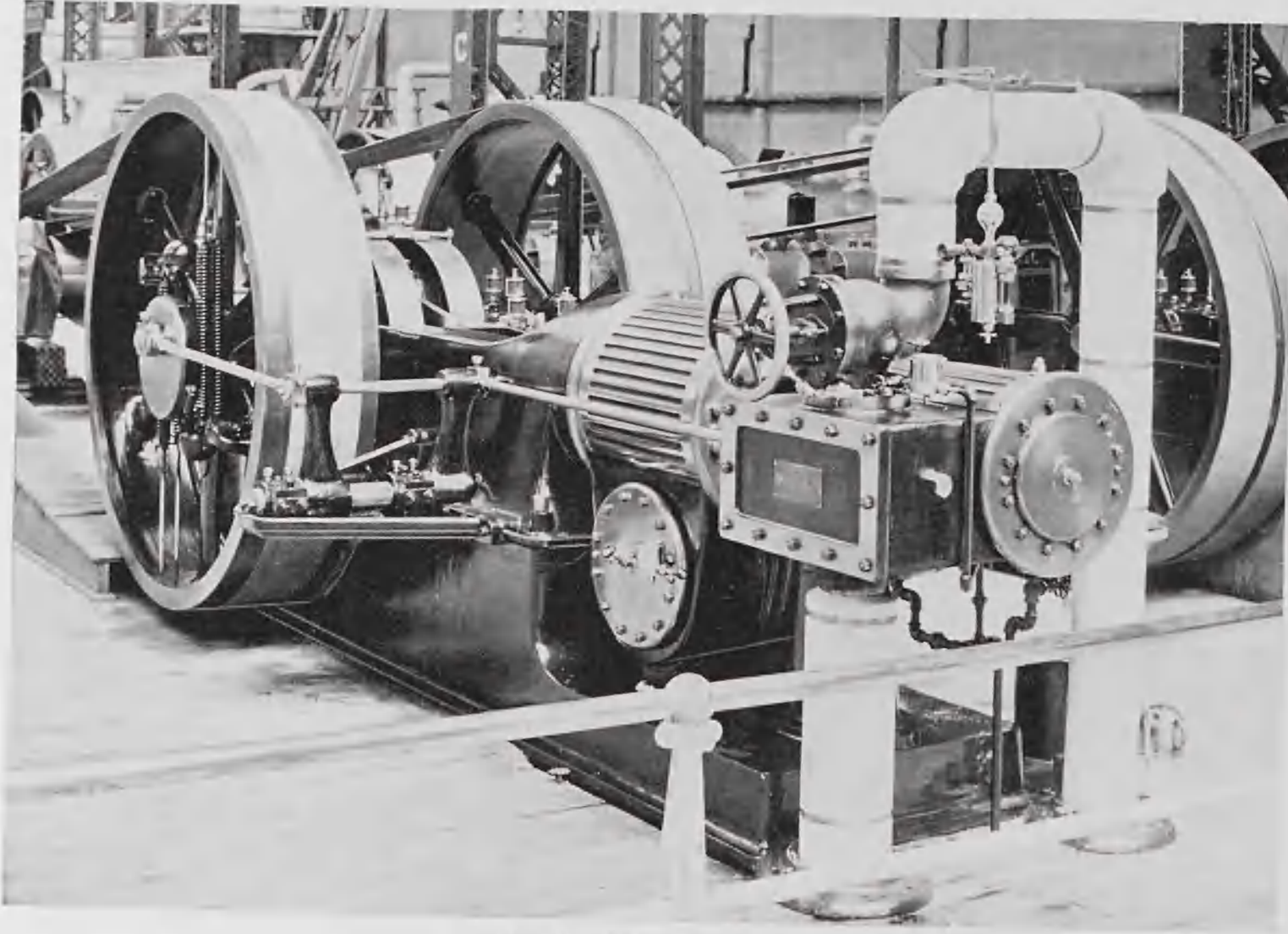
industry his "manufactory sermon," declaring that "an industrious prosecution of the arts of civil life was very friendly to virtue," and urging his people to make such progress in manufactures as would enable them to produce at home what they imported from foreign lands.

Along the southern walls of Machinery hall extend two corrugated iron structures, in which is generated most of the power whereby the buildings and grounds and the great fountain in the central court are supplied with electricity, the power that runs the Administration elevators, furnishes exhibitors with motive force, drives the sewage of the Fair toward the lake, and sets in motion some of the machinery in the hall itself. This primary power plant, known as the boiler-house, is adjacent to the main building, the smaller section, on the other side of the southern entrance way, being called the boiler-house extension. Adjoining these and contained within the main hall and its annex are the 70 engines and 130 dynamos which complete the plant, one fully in keeping with the colossal proportions of the Exposition, and aptly termed the heart of the Fair. Of the 26,000 horse-power developed by its 54 boilers, fully two-thirds is transmitted to the engines and dynamos which generate electricity.

Passing along the galleries of the boiler-houses, on a level with the floor of Machinery hall and a few feet above the line of great furnaces, the visitor may notice that the stokers are attired in neat white uniforms, very unlike the begrimed and grease-stained garments characteristic of the craft. This is explained by the use of oil as fuel, conveyed in the Standard company's pipes from Whiting, Indiana, some forty miles distant.



THE GREAT ALLIS-CORLISS ENGINE



TANDEM COMPOUND ENGINE

The oil is stored in iron tanks, enclosed in a massive brick vault in the south-eastern portion of the grounds, and with a total capacity of 112,000 gallons. This subterranean reservoir is in six compartments, each twice the size of the tanks, and thus is avoided or minimized the danger of explosion, should the grounds be swept by fire. Near by is the pump-house, from which, at a distance of more than half a mile, the oil is delivered as needed at the stand-pipe near the boiler-house. Each of the two pumps is furnished with a suction connection, by which, in case of accident at the boiler-house, the contents of the pipe may be returned to the storage tanks. The main lines of supply-pipes are enclosed in a heavy wooden

box, covered by removable cast iron plates, with branches leading to the boilers which furnish power for the several groups of engines, presently to be described.

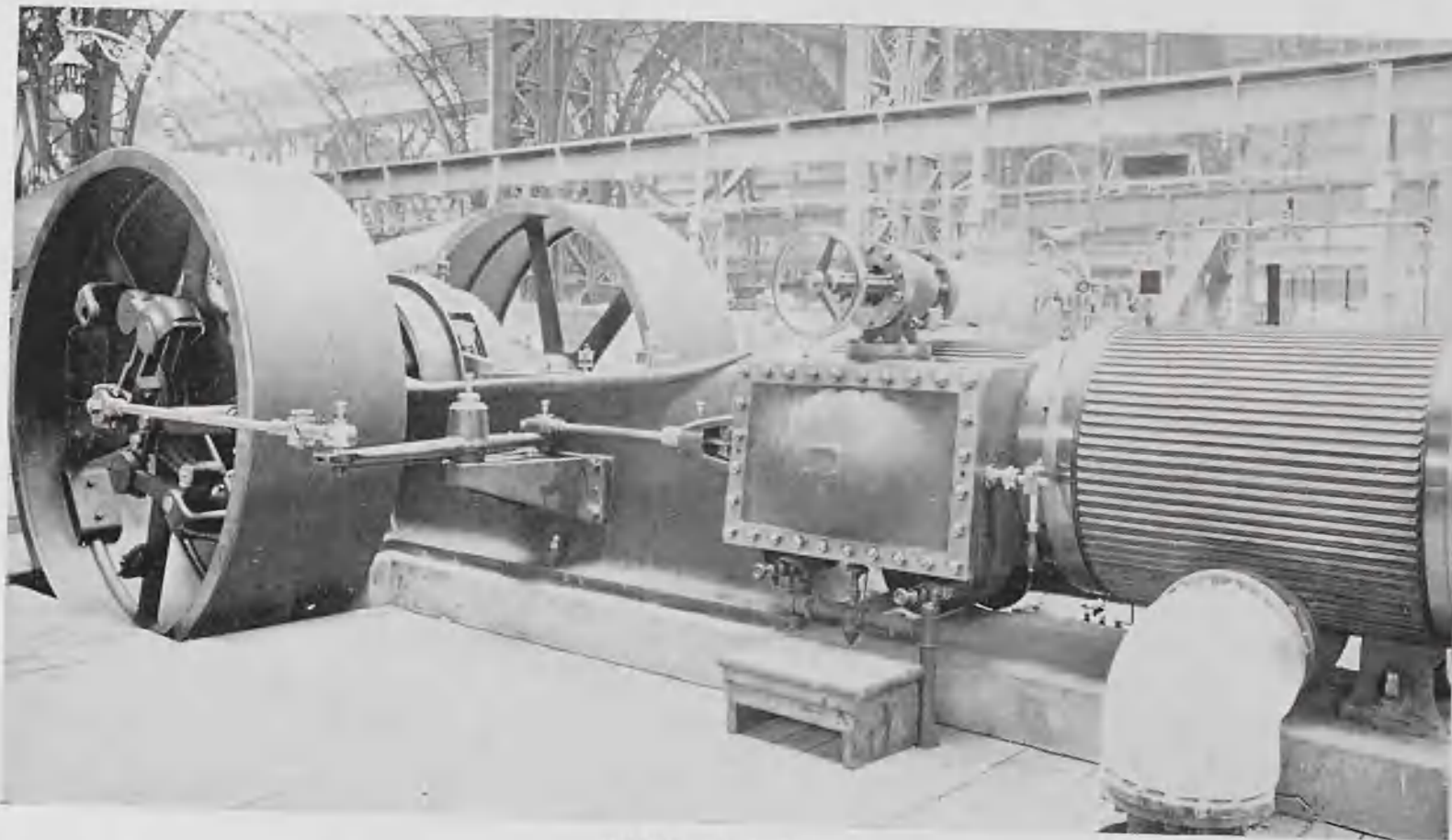


E. P. ALLIS

The boilers are all of the water tube type, which in brief consists of a bank of tubes a few inches in diameter, and a dozen feet long, inclined upward, and connected with a large steam drum or reservoir. The tubes are expanded at either end, and the entire apparatus is filled with water up to about the middle of the drum. As the steam is generated by the flames beneath, it passes from each pair or battery of boilers into one common pipe, which delivers it in turn to the headers, or reservoirs, located under the gallery floor. The water is then drained from the headers, and returned to the boilers for further use by a separate system of pipes. To boilers of this pattern it is claimed that even an explosion causes but little damage, since the enormous power which they generate is distributed between eleven or twelve thousand tubes.

Arranged with reference to the uses for which they are intended, the group of electrical engines is by far the most remarkable. The largest in this class is the quadruple expansion condensing engine, exhibited by Allis and company, of Milwaukee, and used in the operation of two dynamos with an aggregate capacity of

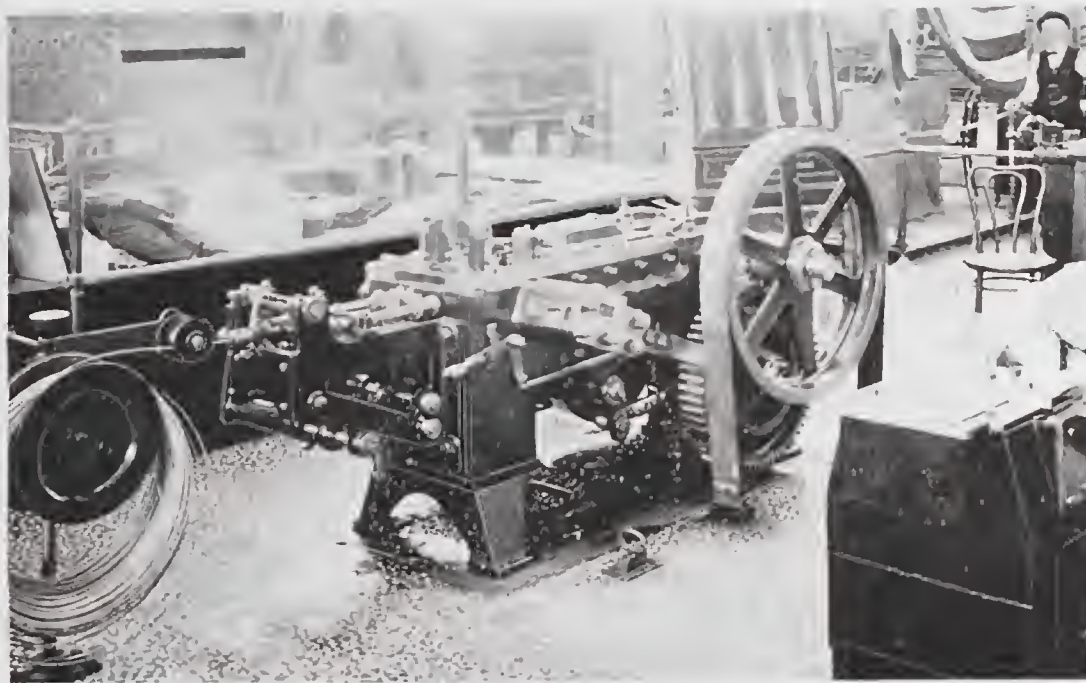
20,000 incandescent lights. With perhaps one exception, the entire mechanism constitutes the largest single electric-light plant in the world, and there is no stationary engine of greater size in existence. The engine itself is of 2,000 horsepower, and as to its dimensions, it may here be stated that the fly-wheel is 30 feet in diameter, length of shaft 17 feet, diameter of largest cylinder nearly 6 feet, and that it occupies some 3,000 square feet of floor space. Near the railing which encloses it are two faded yellow documents, framed, and under cover. One of them is the original contract awarded in 1796 to the firm of Boulton and Watt for the



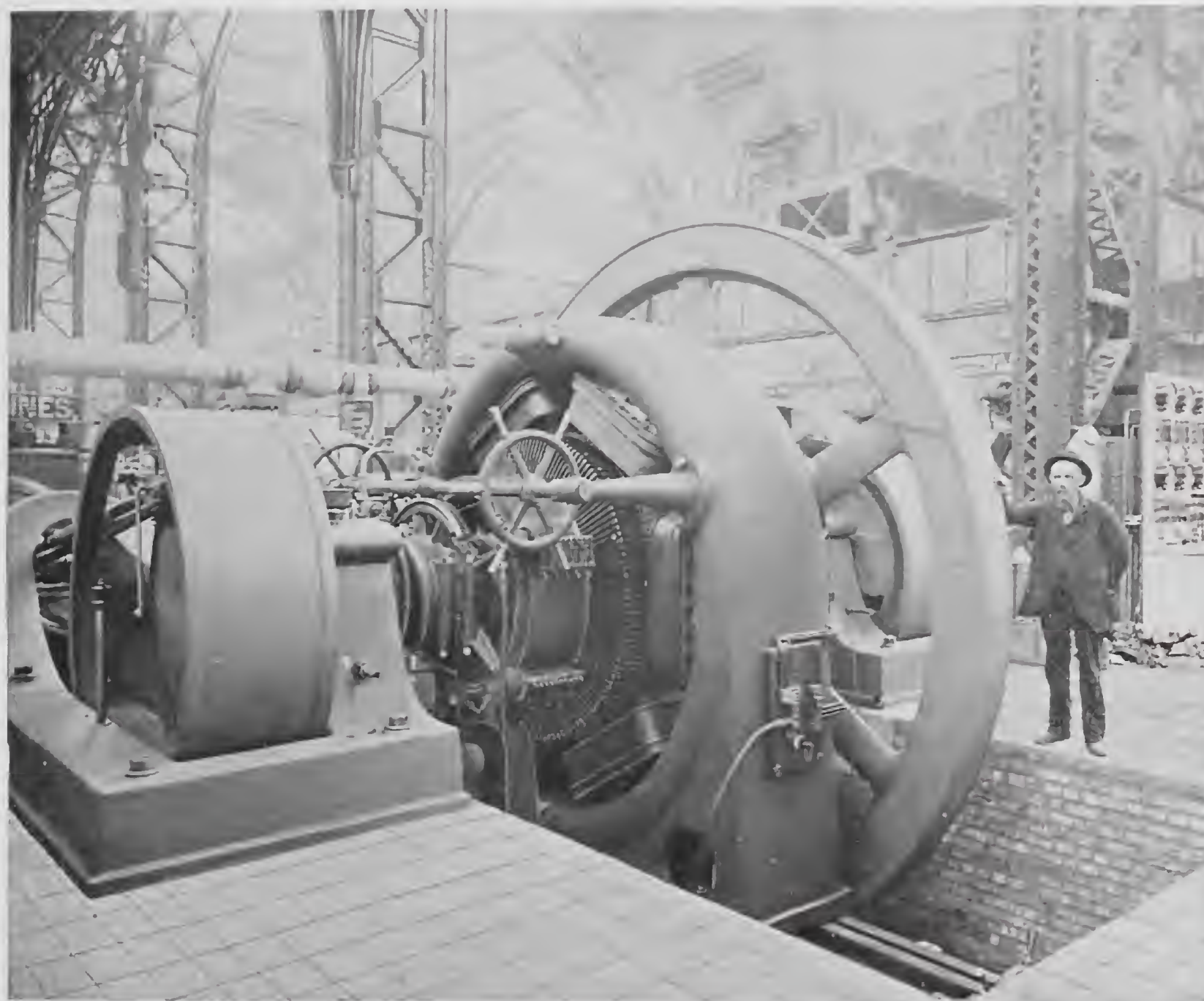
COMPOUND ENGINE

construction of a steam engine for the Birmingham Flour and Bread company, and attached to it is a schedule of some of the materials to be used.

The largest collection of engines in Machinery hall, or elsewhere in the Exposition, is that of the Westinghouse company, of New York, which alone has thirteen specimens of its workmanship, with an aggregate of more than 7,400 horse-power. It is worthy of note that among all the engine builders of the New England states, only two Rhode Island firms are represented, the middle and western states furnishing the bulk of the display. Among the more attractive exhibits is a small nickel-plated engine of Iowa manufacture, of cunning workmanship and perfect finish.



COLD FORGING PROCESS

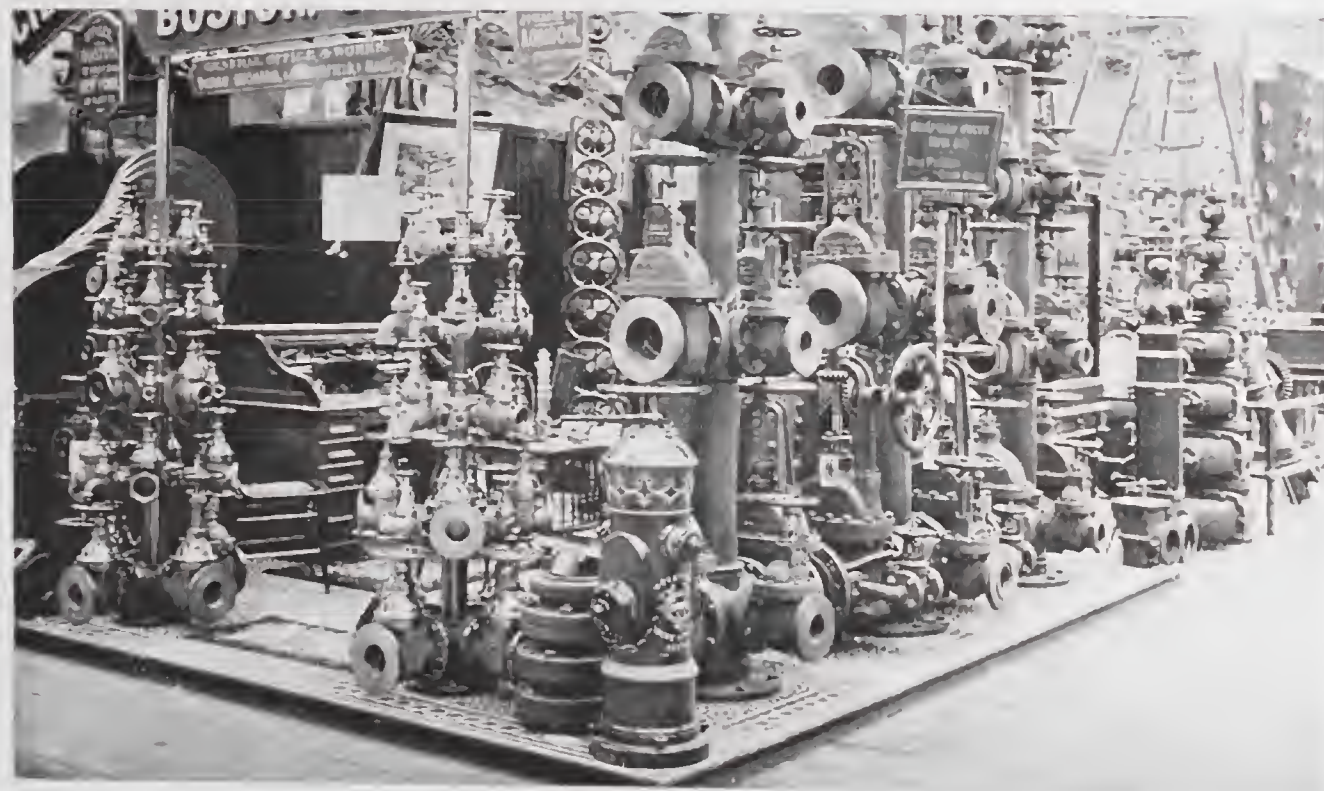


WESTINGHOUSE GENERATOR

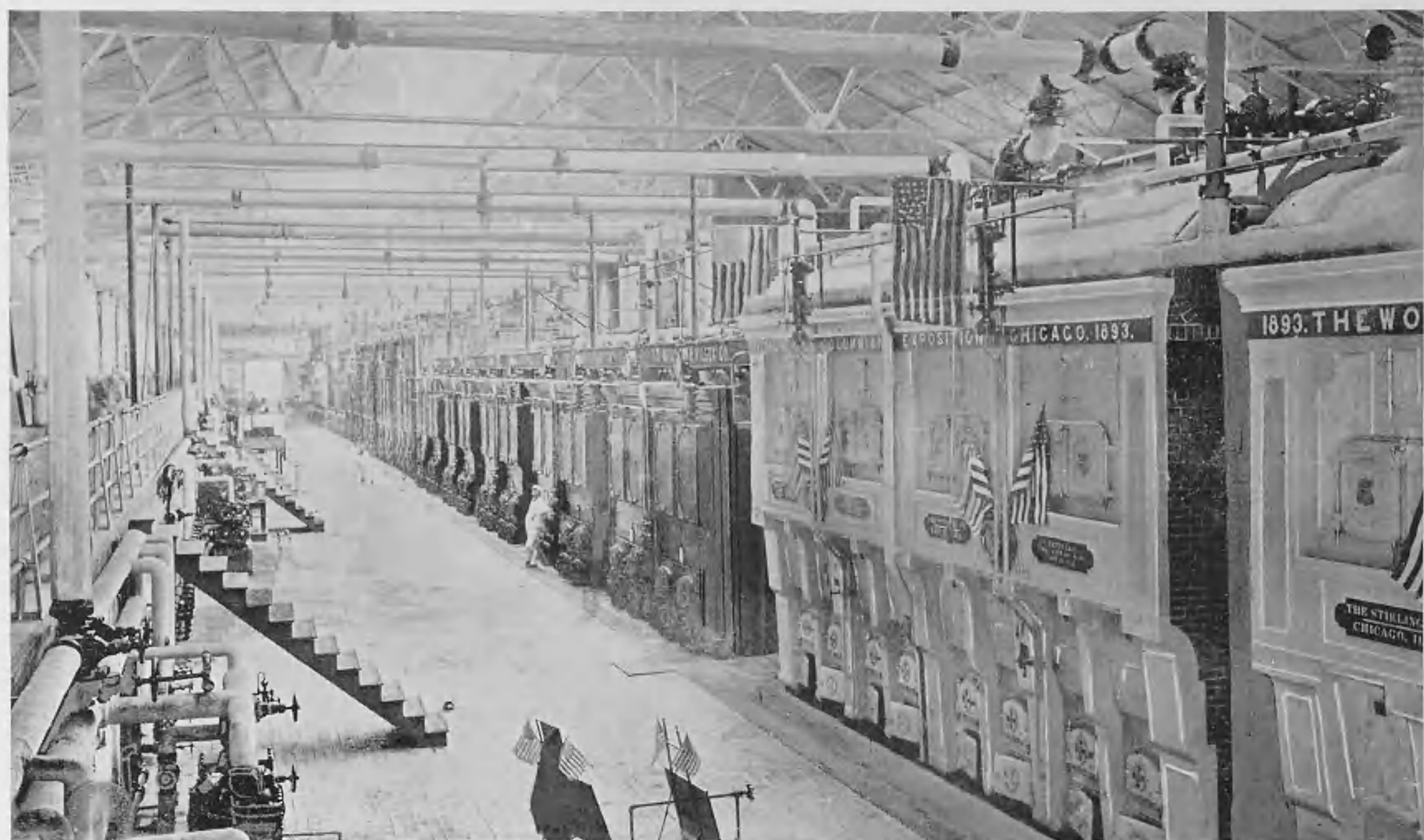
and its annex. By these shafts, revolving eighteen feet above the floor, power is furnished to exhibitors by merely throwing a belt over the one nearest to their allotted space. Engines of British and German make drive the machinery in their sections, and for the same purpose the United States division has several of home manufacture.

By several manufacturing companies are special exhibits of their appliances for the transmission of power, one firm using manilla rope, another, cow-hide, and a third, a stout duck fabric, in place of leather belting. But on all sides is the regulation shafting and belting, a New Hampshire company producing what is claimed to be the largest belt in the world,

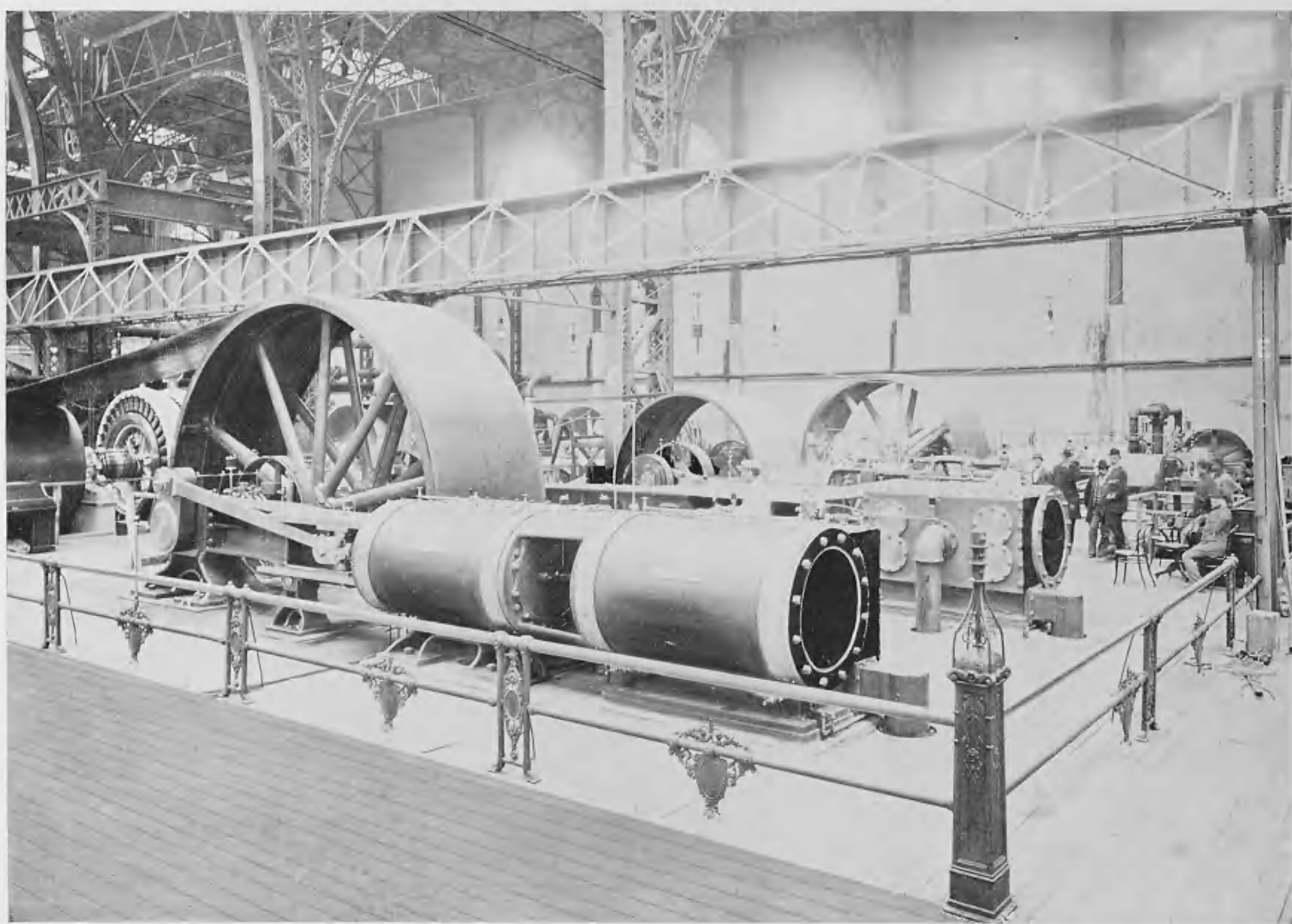
Compared with the engines which furnish electric power, and which in turn derive their motive force from the boiler plant, those that supply steam power or compressed air are of minor importance, the latter being mainly used by the elevators and certain of the locomotives in the Transportation building. Few of the mechanisms in motion within the hall derive their power from the regular plant, the main use of which is, as I have said, the generation of electricity, conveyed by underground wires to every portion of the grounds. Some fifteen engines, scattered through the building and acting independently of the power plant proper, drive six lines of iron shafts, each extending for a distance of 1200 feet along the main structure



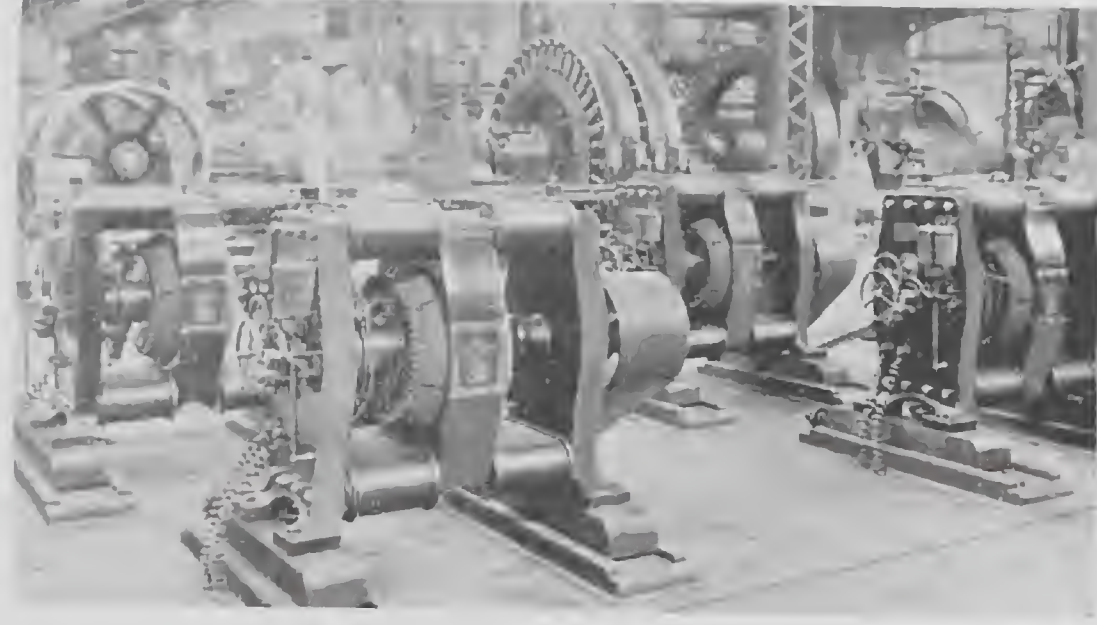
VALVES AND PIPES



LARGEST BOILER HOUSE IN THE WORLD



BUCKEYE ENGINE COMPANY



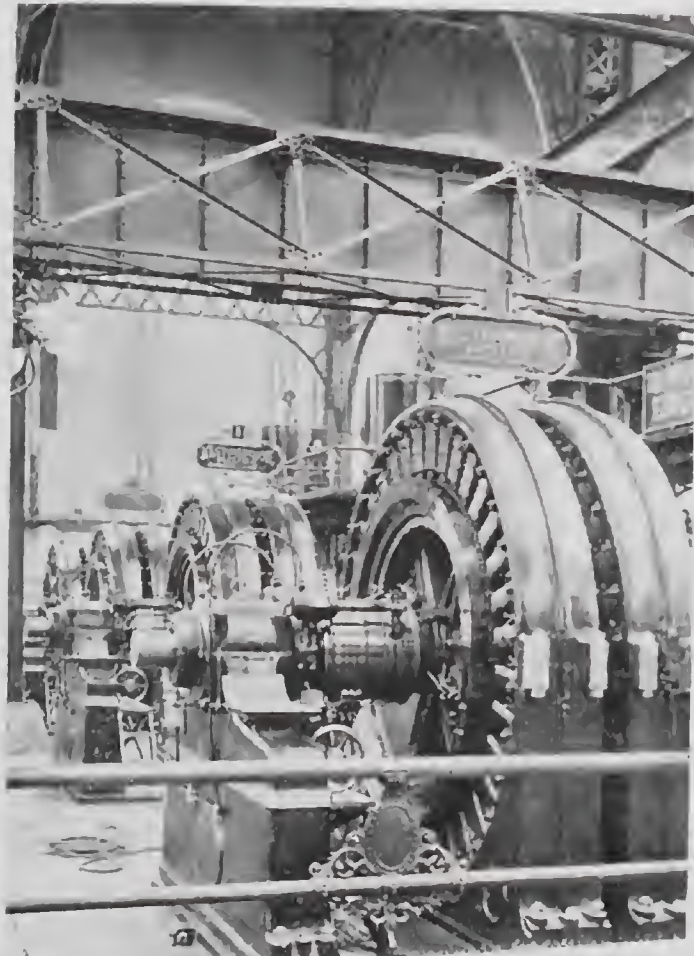
WOOD'S DYNAMOS

more than 200 feet long, by eight and a half in width. It is fashioned in three-ply, oak-tanned, weighs 5,176 pounds, and in its construction there were used 569 hides.

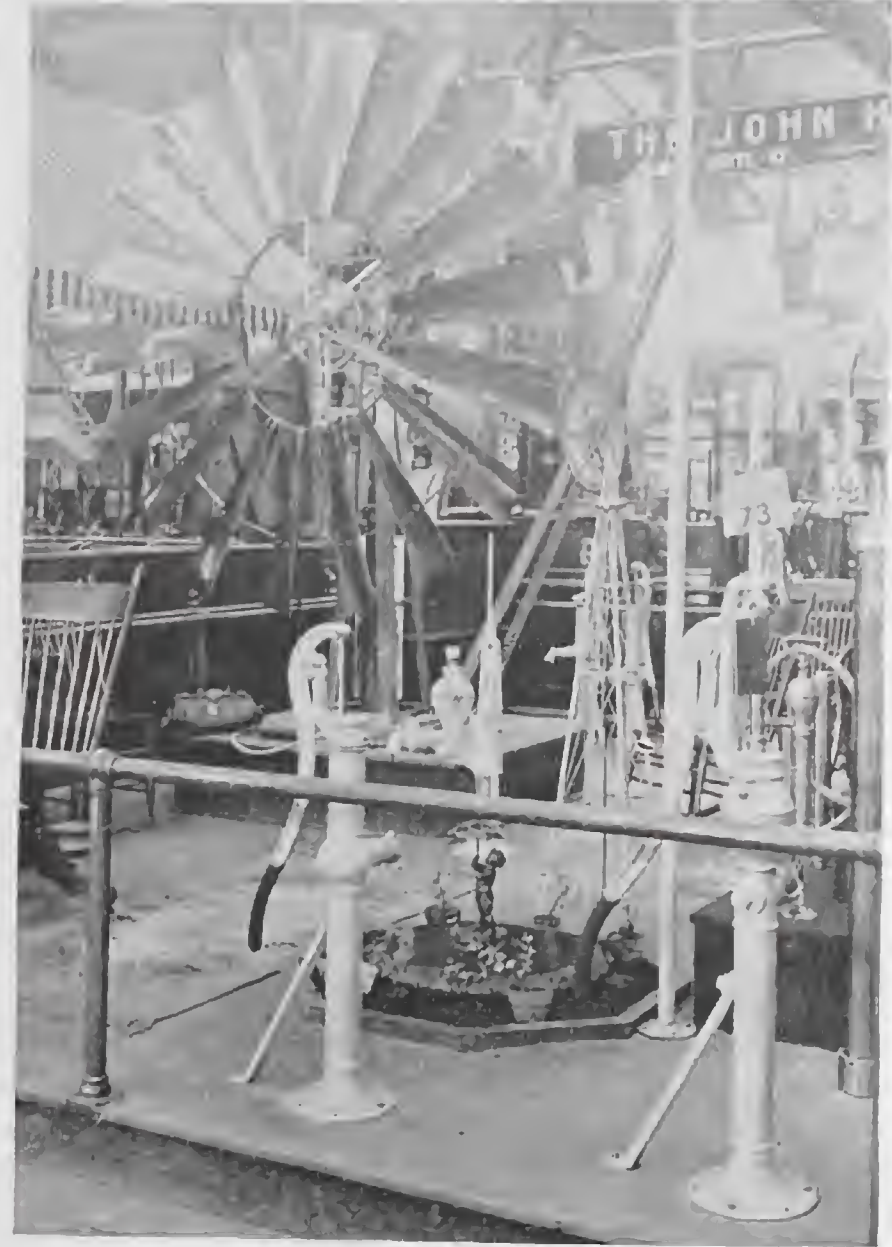
Hoisting engines of all descriptions are classed with motors and apparatus for the transmission of power. Perhaps the most remarkable of this group are the travelling cranes, operated by electricity, three of them in Machinery hall, and one in the machine-shop south of the annex. The latter can haul a weight of from ten to fourteen tons, swing its load aloft, and raise or lower it, all without jar, and with scarcely a tremor. Its motions are readily guided by a single workman, or even by an intelligent boy. The other cranes are of mammoth proportions, as in truth they must be, for during the installation process they placed in position all the more massive machinery. Their present use is to carry passengers to and fro, for which purpose they are suitably equipped. Each of them has a span of 75 feet, the tracks being laid on plate girders, and supported by steel columns about twenty feet high. The supporting structures are designed for a load of more than forty tons for each end of the crane, which travels at the rate of some 300 feet a minute. At the western end of the annex is a balcony, reached by several elevators, the latter forming of themselves an exhibit by the Crane company.

In the line of hoisting machines the United States has the only display. Some of the engines are especially used in building, the cranks being so constructed that a heavy load can be raised or lowered with remarkable smoothness and rapidity. Others, designed for bridge construction, are so fashioned that all friction may be avoided. Quarrymen may also inspect the engines or models best adapted for their work, some of them having masts and booms by which a weight of ten or twelve tons may be readily lifted and moved in a straight or circular line. Many of them are worked by electricity, and are controlled at will by a single engineer, herein being a forcible illustration of progress in the invention of labor-saving machinery.

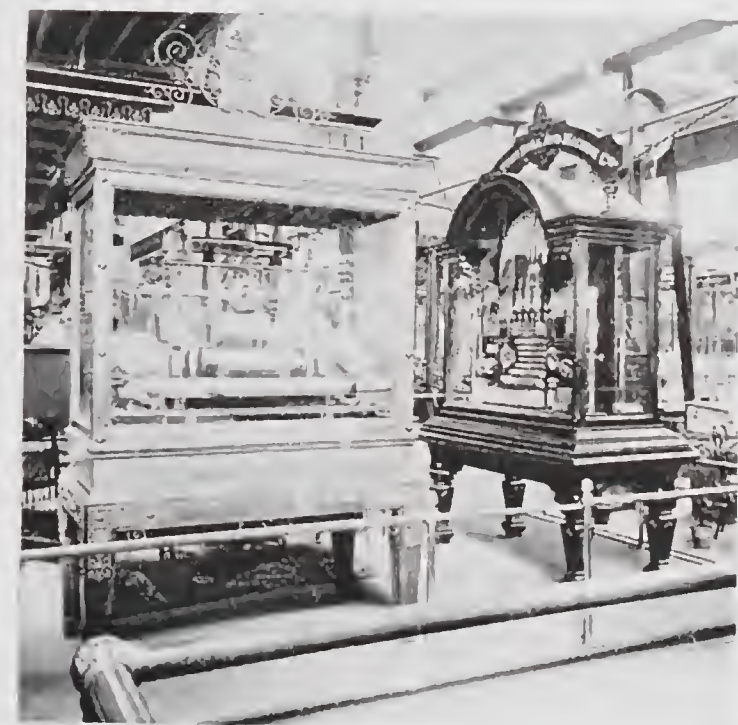
The exhibit of pumping engines, also included in this class, is grouped around a basin of cement filled with water, and placed at the junction of the main hall and its annex. There are about fifty exhibitors, by whom are shown all kinds of machines, single, duplex, horizontal, and vertical, iron and wooden pumps, hand pumps and those operated by compressed air and steam, pumps for the farm-yard and others adapted to artesian wells. To demonstrate their several qualities the exhibitors depend upon the central reservoir, from which are drawn and returned its contents according to the power with which the pumps are supplied. One powerful force pump discharges into a large wooden trough; others send columns or sprays of water into the tank, and a Cincinnati firm has erected a shapely fountain, around which its air compressors and steam pumps smoothly perform their offices. An Illinois company displays an aerating pump which forces air to the bottom of a cistern, thus



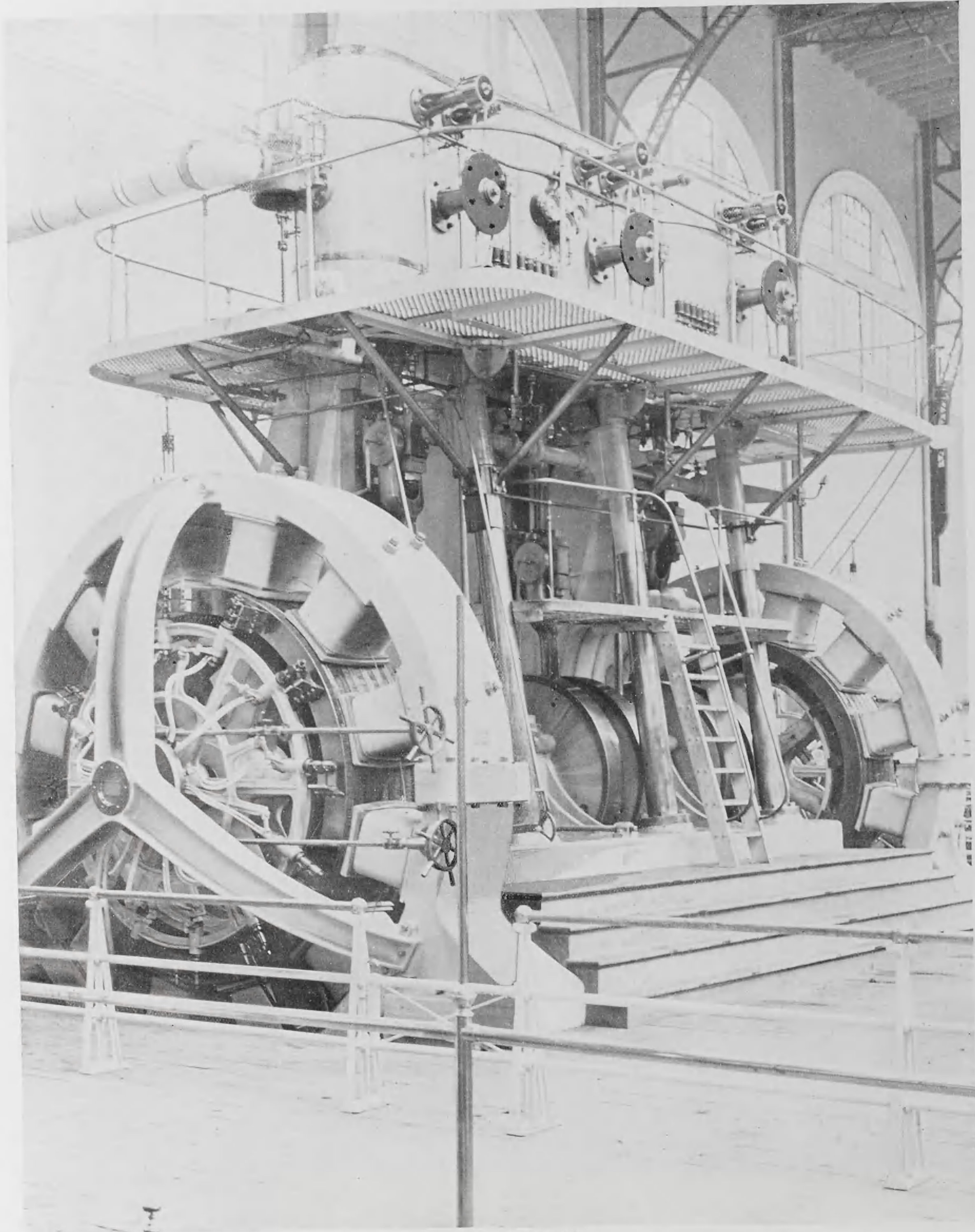
WESTINGHOUSE DYNAMO



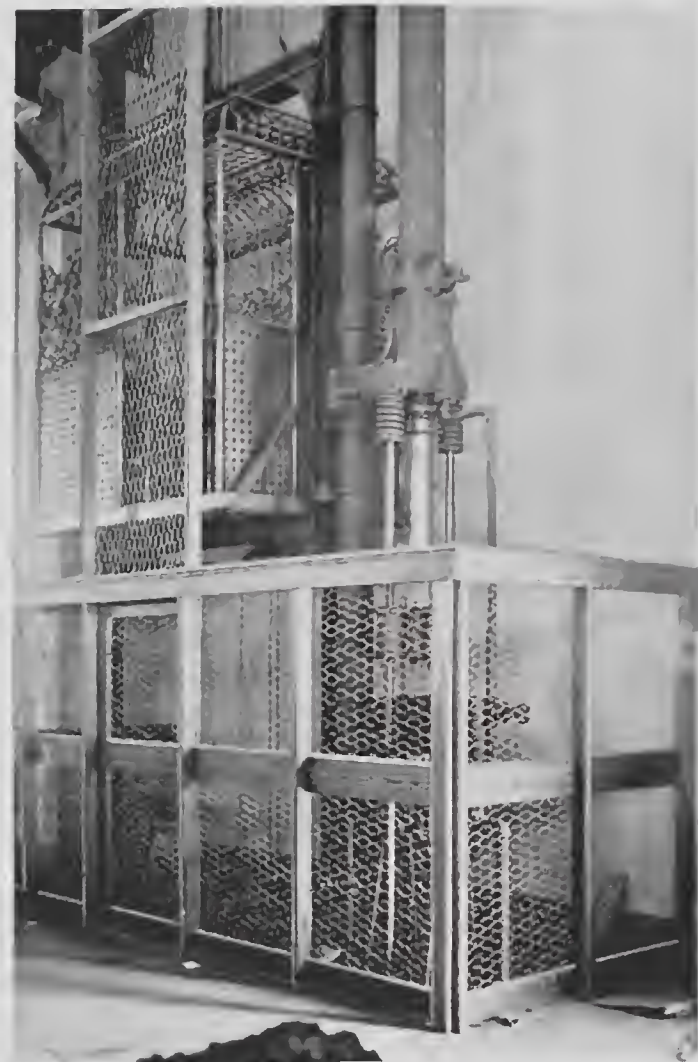
COPPER WIND MILL



TWIST DRILL EXHIBIT



EDISON ENGINE AND DYNAMO



CRANE ELEVATOR

nection with the Waukesha Hygeia New Orleans factory; but within machine of a New York firm, with

In the annex, west of the power plant, is a small collection The only display of large fire Falls, New York; but several Chicago chemical apparatus, and hand group consists of hose, nozzles, of fire-escapes, among the last of contrivances is a cage moving on an upright, the crank that propels below. Most of the exhibiting firms their apparatus in the fire stations and at the fire above referred to

The largest of the miscellaneous western portion of the annex, overflowing thence into the model machine-shop south of it. The latter was furnished entirely by a New York and Chicago company, for the purpose of displaying the specialties of manufacturers for whom they are agents. Here also the several firms with which the company has dealings exhibit specialties of their own, as forgings from iron, steel, copper, and bronze, lathes, vises, planers, drills, and punching and shearing devices. One of the exhibiting companies has a contract with the government for furnishing the army and navy departments with more than \$1,000,000 worth of turning, boring, and rifling lathes.

Beyond the machine-shop, and in the body of the hall, is an extension of this exhibit, where not only machinists, but steam fitters, blacksmiths, and tinsmiths may examine the most improved appliances of their trades, and at times may see them handled by skilful craftsmen. Included in this collection are riveting machines, shears for cutting sheet metal, hydraulic forging presses, power hammers, milling machines, portable forges, drills, planers, pneumatic pressing machines, and special machinery for making car pins and wheels, and the various parts of locomotives, marine boilers, and metallic bridges. A Trenton factory has its own brand of anvils and vises, and claims to be the oldest establishment of the kind in the United States. From the mint at Philadelphia comes

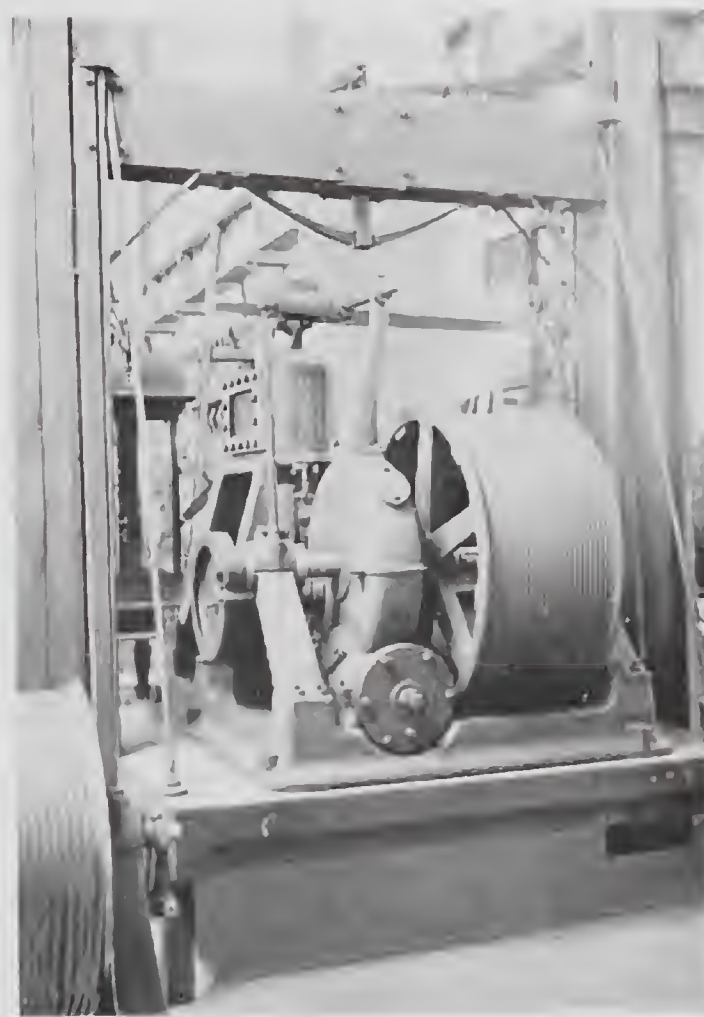
purifying the water; and a Pennsylvania establishment has on exhibition a steam-pump that will raise water from a depth of 500 feet, designed for the use of factories, mines, and irrigating systems. Of windmills there is only a single specimen; but there is a special out-door exhibit of windmills in connection with the Agricultural department, and especially of such as are used for farming purposes.

Adjacent to this section are the soda-water apparatus, apparatus for drawing beer, and for bottling and corking. By one firm is displayed its methods of carbonizing soda and mineral waters, champagne and other wines, and by another a machine for washing and rinsing beer bottles in one operation. Among the miscellaneous articles included in this group are iron and other metallic pipes, tubes, and fittings, stop valves, cocks, and such accessories for transmitting power. Under the heading of hydraulic and pneumatic apparatus is diving and refrigerating machinery. In the United States section there is no general exhibit of diving apparatus; but in the Midway plaisance experiments are shown in deep sea diving, illustrating the uses of modern appliances, including the workings of the sub-marine bell telephone. The largest exhibit of refrigerating apparatus and machines for making ice was installed outside the building, in the Cold Storage plant, elsewhere described in this chapter,

together with its destruction by fire.

In separate structures also are the exhibits of a Chicago firm in con-mineral springs company, and of a the hall is the 150 ton refrigerating double acting compressor.

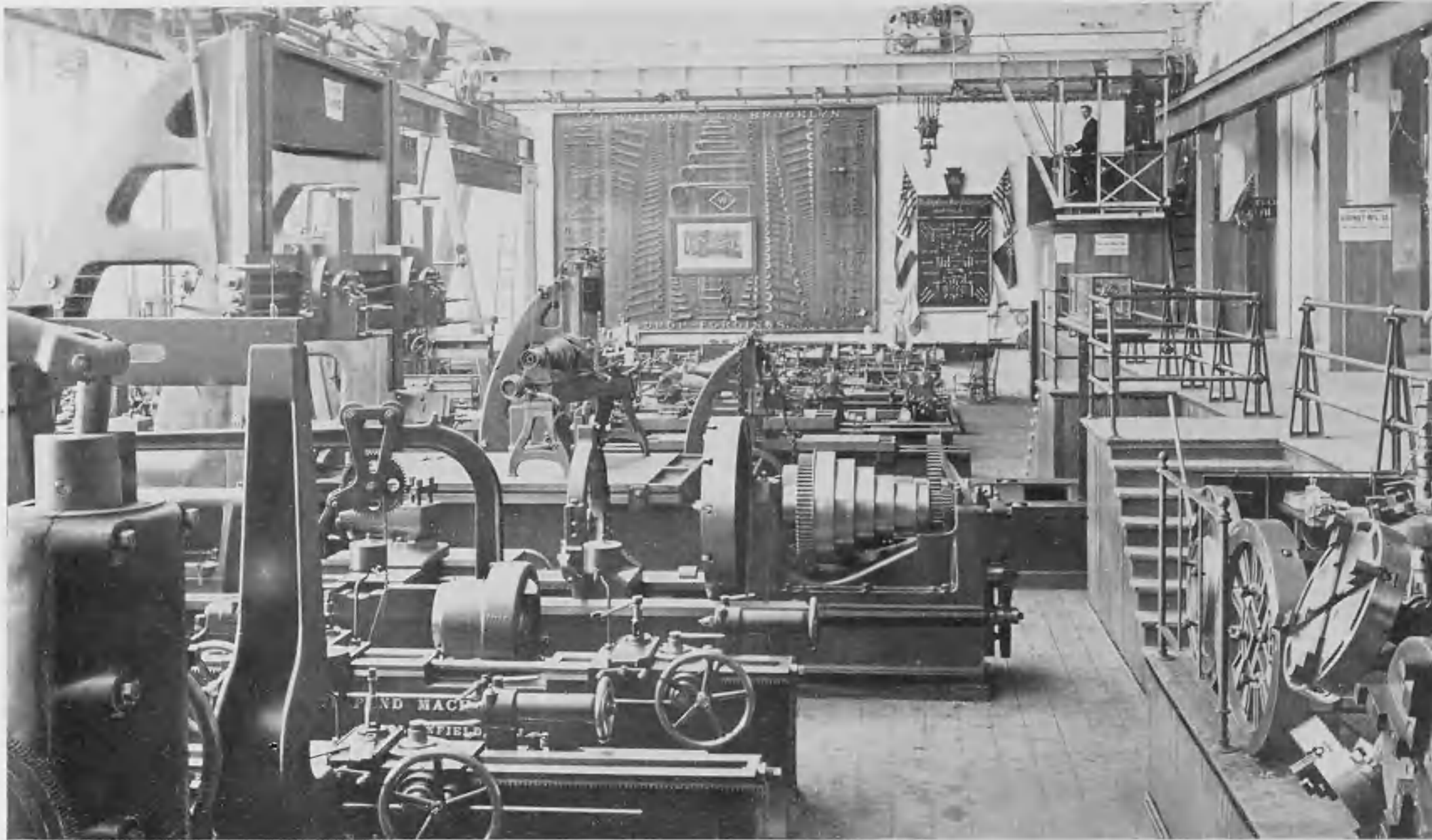
engines which form a portion of the of apparatus for extinguishing fires. engines is by a company at Seneca houses show the latest inventions in grenades. The remainder of the couplings, water towers, and models which one of the most practicable an inclined ladder, supported by the escape being wound by operators in this department have installed distributed throughout the grounds, many of them were put to the test. miscellaneous exhibits is contained in the



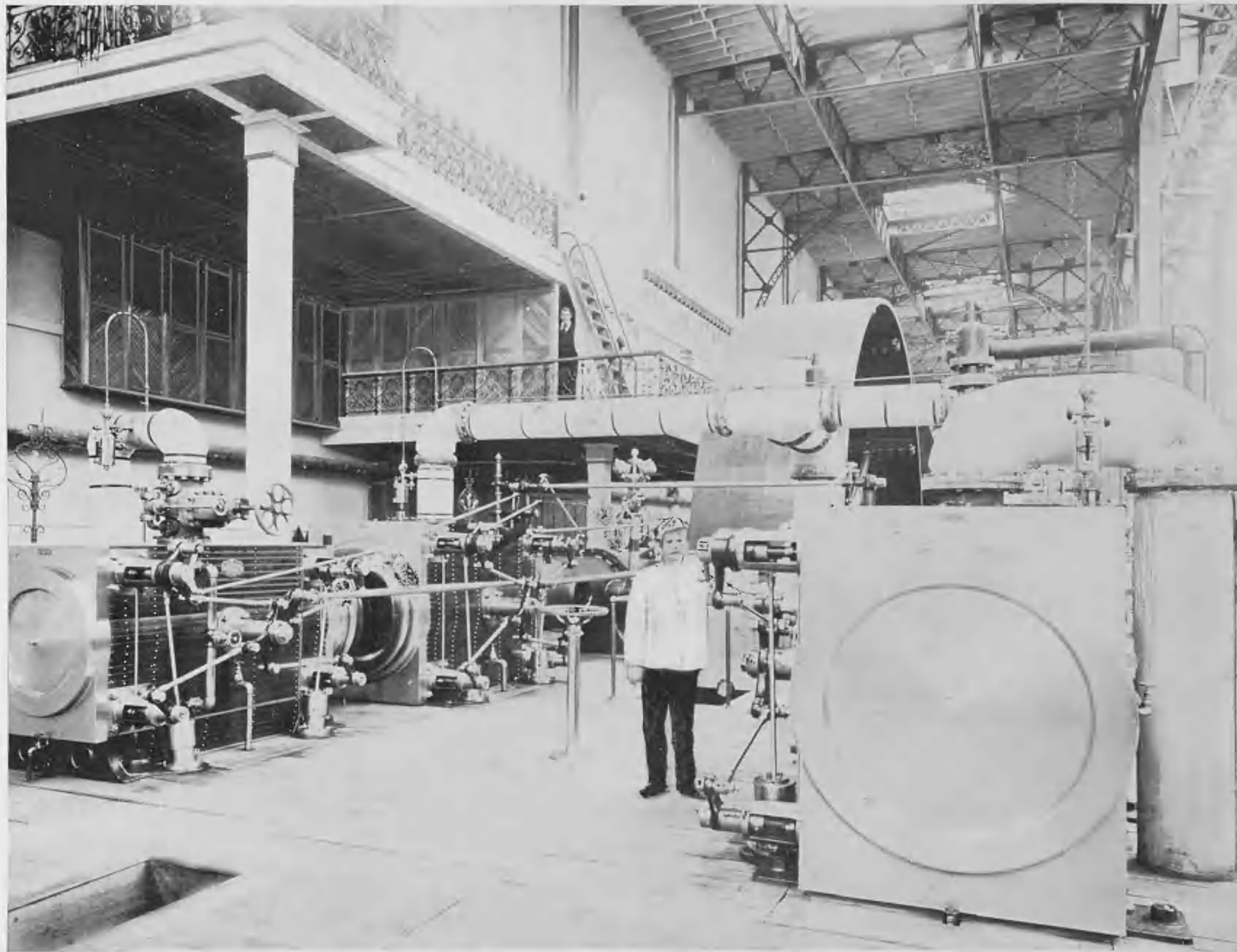
HYDRAULIC ELEVATORS



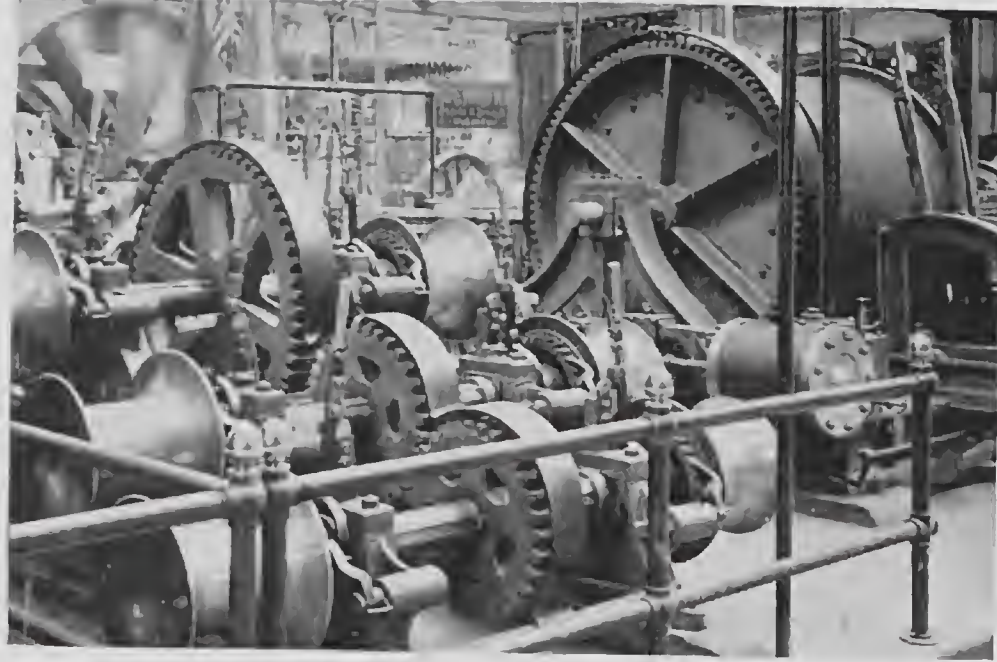
THE LARGEST BELT IN THE WORLD



MODEL MACHINE-SHOP



TRIPLE EXPANSION ENGINE



HOISTING ENGINES

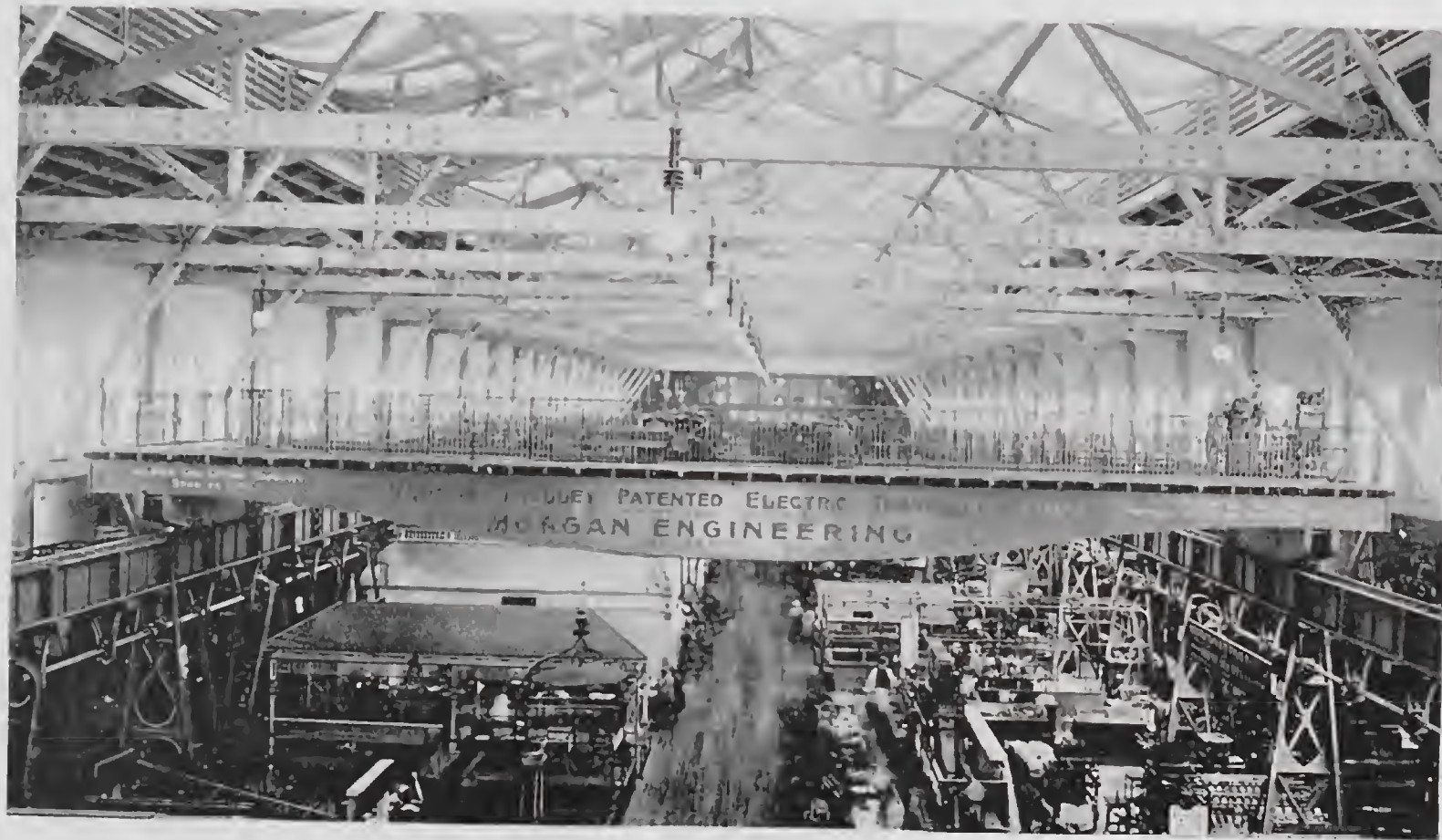
the first steam coining-press used by the government, and among other interesting exhibits are machines which transform solid bars of steel into wire netting for gallery fences and for use as substitutes for lathing, with such as make hooks and eyes, chains, and steel fence posts.

Of machinery for the manufacture of textile fabrics and clothing, there are more than 70 exhibits in the north-western section of Machinery hall. In the former class are included not only apparatus for the production of silks, cottons, linens, and woollens, for carpets, tapestries, laces, and embroideries, for ropes and twines, and other fibrous products, but such as is used for the making of paper, felt, and rubber goods, and for the preparation and working of leather. Here may be studied the various stages of textile manufacture in all its branches, and especially in the operation of the looms,

not only by way of illustration, but in the production of goods to order, forming an attractive and realistic working display. Silks, for instance, of intricate figures, are fashioned before the eyes of the observer by processes in which are still retained, though with many improvements, the principles evolved by Joseph Marie Jacquard, whose invention brought on him first the maledictions, and then the homage of Lyons silk-weavers.

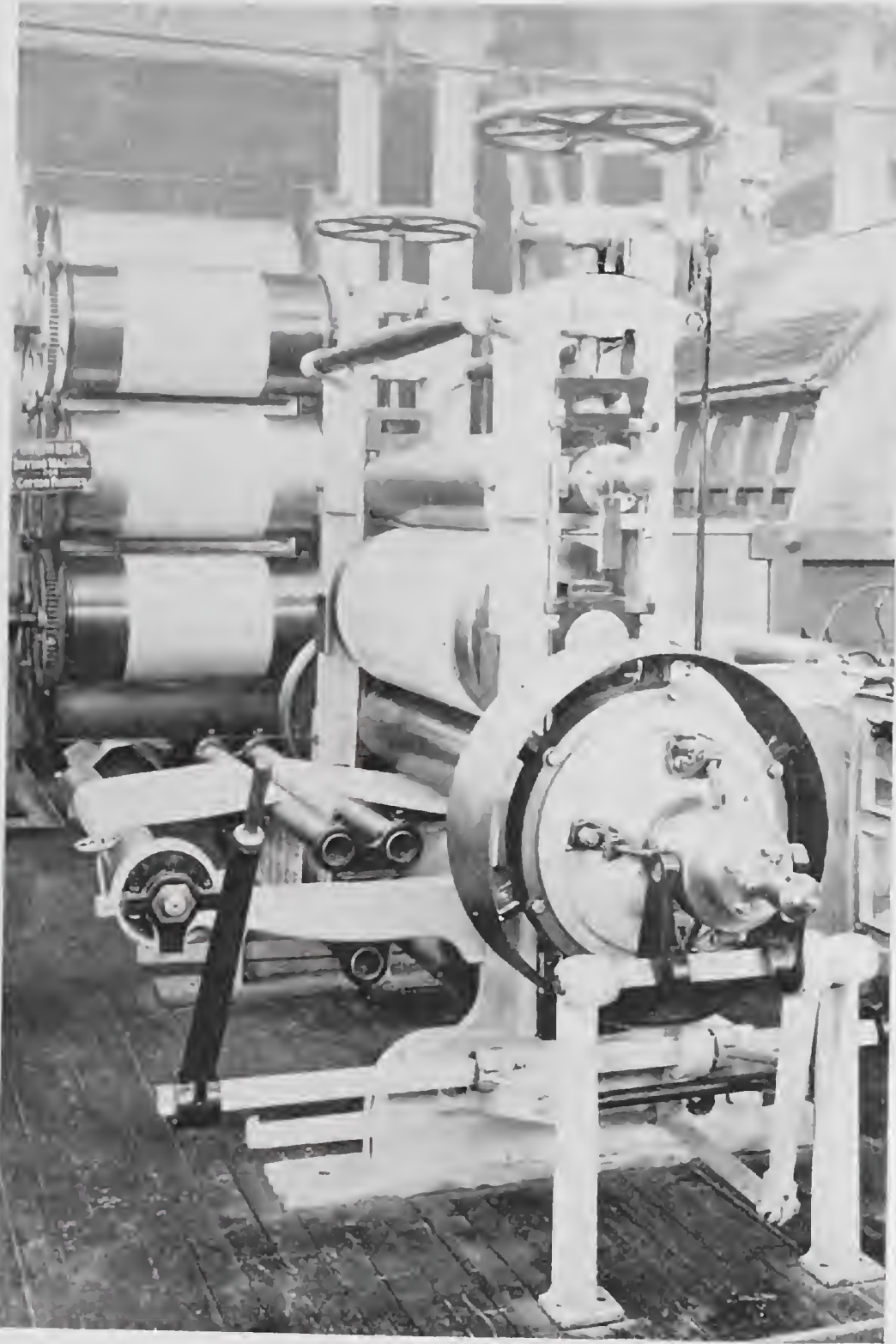
Very noticeable are the improvements made in looms of the Jacquard pattern, even within the last

decade. Among visitors to the Fair are those who still remember the first of these looms exhibited in Chicago, not many years ago, at a local exposition held on the lake front. Though a huge and cumbersome piece of mechanism, it performed many wonderful feats, or such they seemed to the throngs that gathered around it, producing, for instance, exposition badges and portraits of General Grant, all of them woven in silk. In contrast with it are those of modern make, as displayed in this department, with countless strings of perforated cards, set in motion at every throw

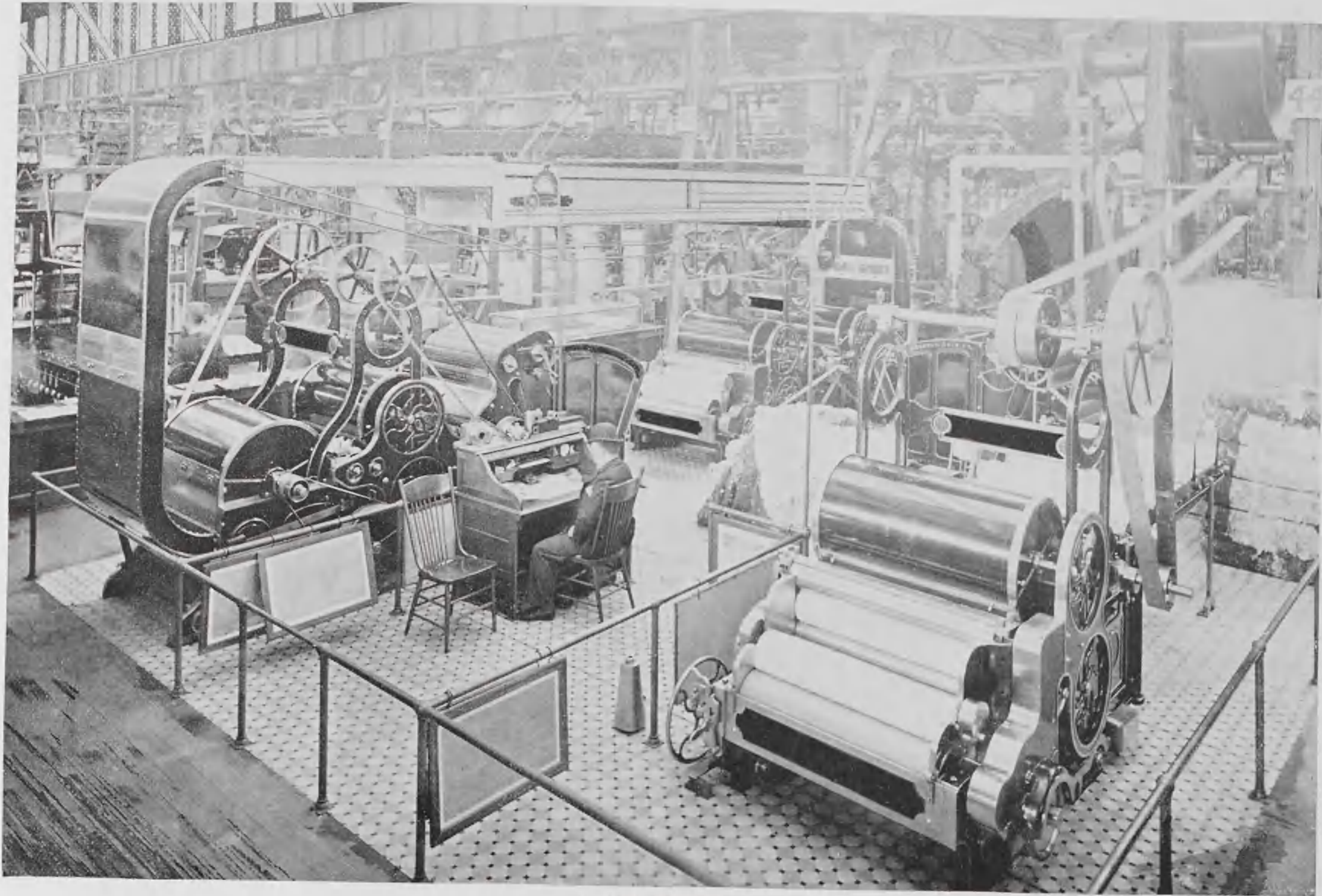


MORGAN ELECTRIC TRAVELLING CRANE

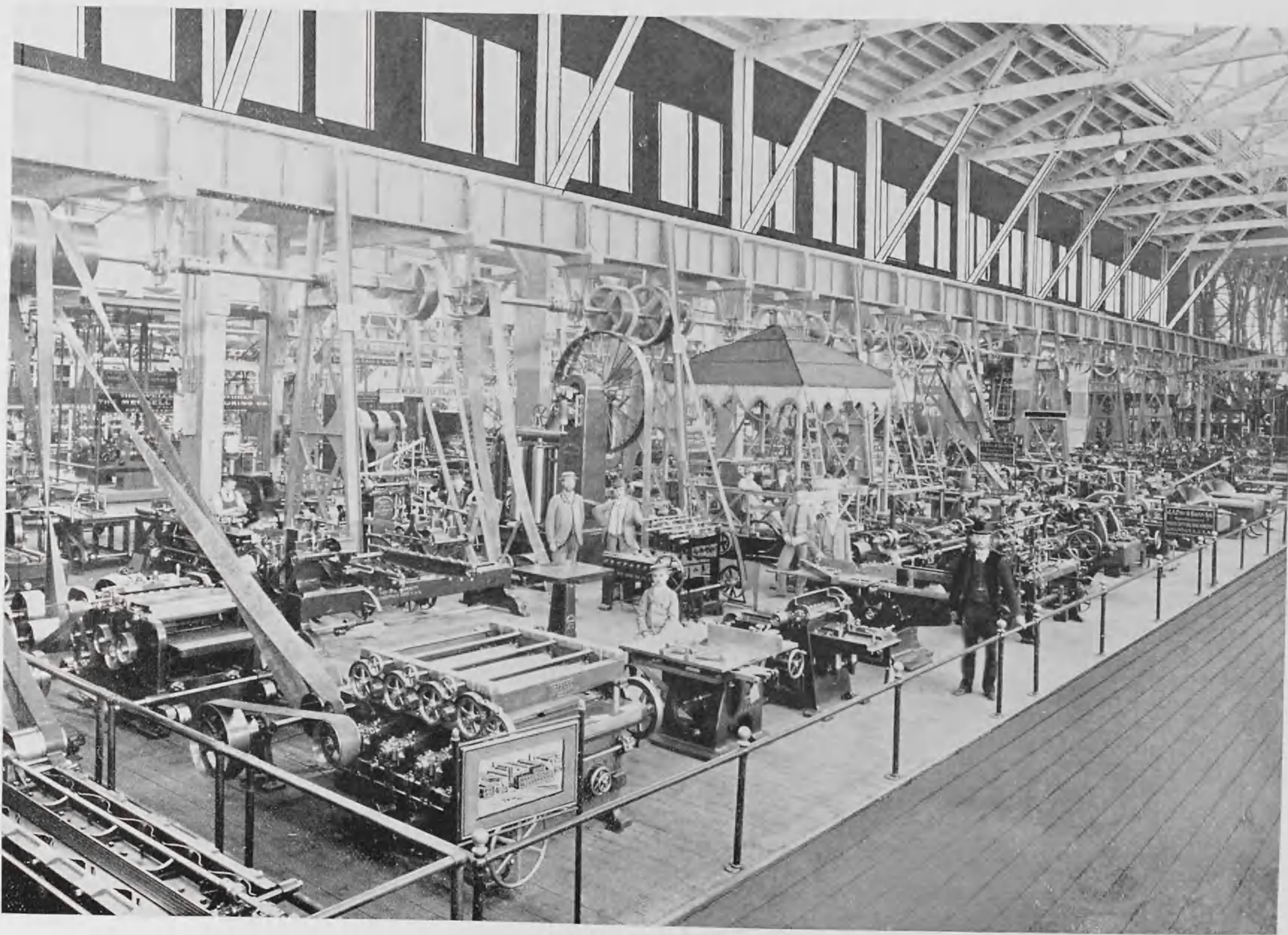
of the shuttle, each perforation representing one or more threads in the woof. Such looms are used mainly for the more intricate designs, and not alone for silk-weaving, but for the weaving of carpets, and other textile fabrics. By the largest among this group are woven bordered carpets twelve feet square, and at the smallest



COTTON CALENDERING AND DRYING MACHINE



COTTON MACHINERY



WOOD CUTTING MACHINERY



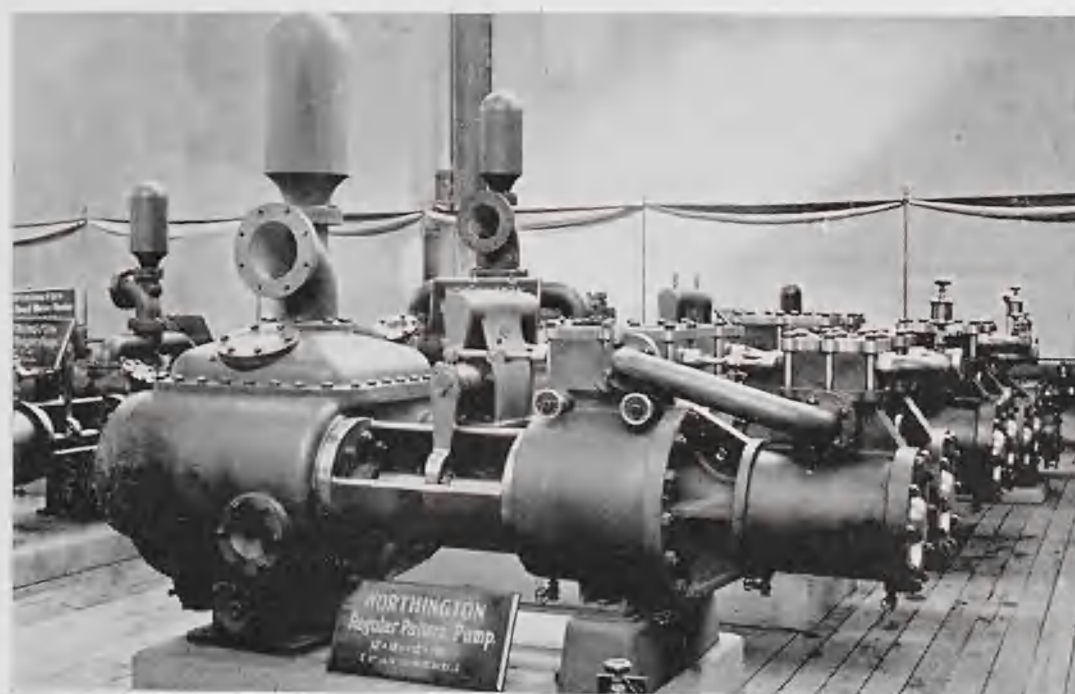
FOUNTAINS, PUMPING ENGINE EXHIBIT

of antique pattern, and fashioned entirely of wood, sits an aged man from a Philadelphia factory, moving the treadle by foot, and the shuttles by hand. With the exception of one for making Turkish towels, this is the only hand-loom in the collection. At the former a Turk, in orthodox native costume, bends over his task, and with true oriental deliberation swings forward his beam, and passes his shuttle through the warp. Next to him, by way of contrast, a modern Jacquard weaves a couple of towels at a time.



FORCE PUMP AND FOUNTAIN

Of machinery for the production of silk goods there are several exhibits, some of them including looms for the manufacture of cottons, woolens, and mixed or miscellaneous textiles. Among the more interesting collections are those from Worcester, Massachusetts, one of its exhibiting firms stating that 10,000 of its looms are at work in foreign lands. A Philadelphia house has a large display of apparatus; Pittsburgh and Paterson are also represented, and there is a single machine from the quaint old Connecticut seaport of Stonington, founded on Long Island sound in 1649, and where still are traces of its bombardment by a British squadron during the war of 1812.

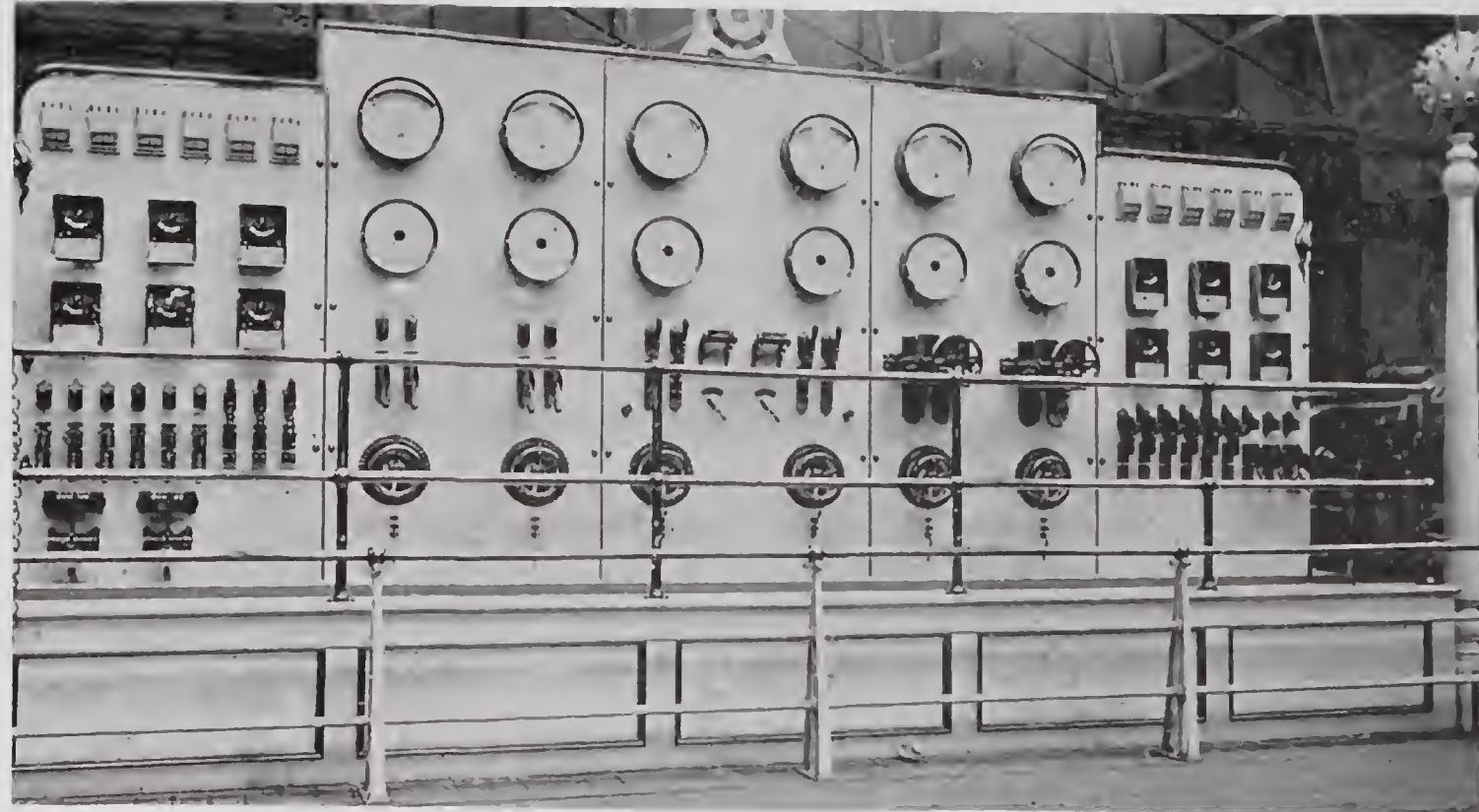


WORTHINGTON STEAM PUMPS

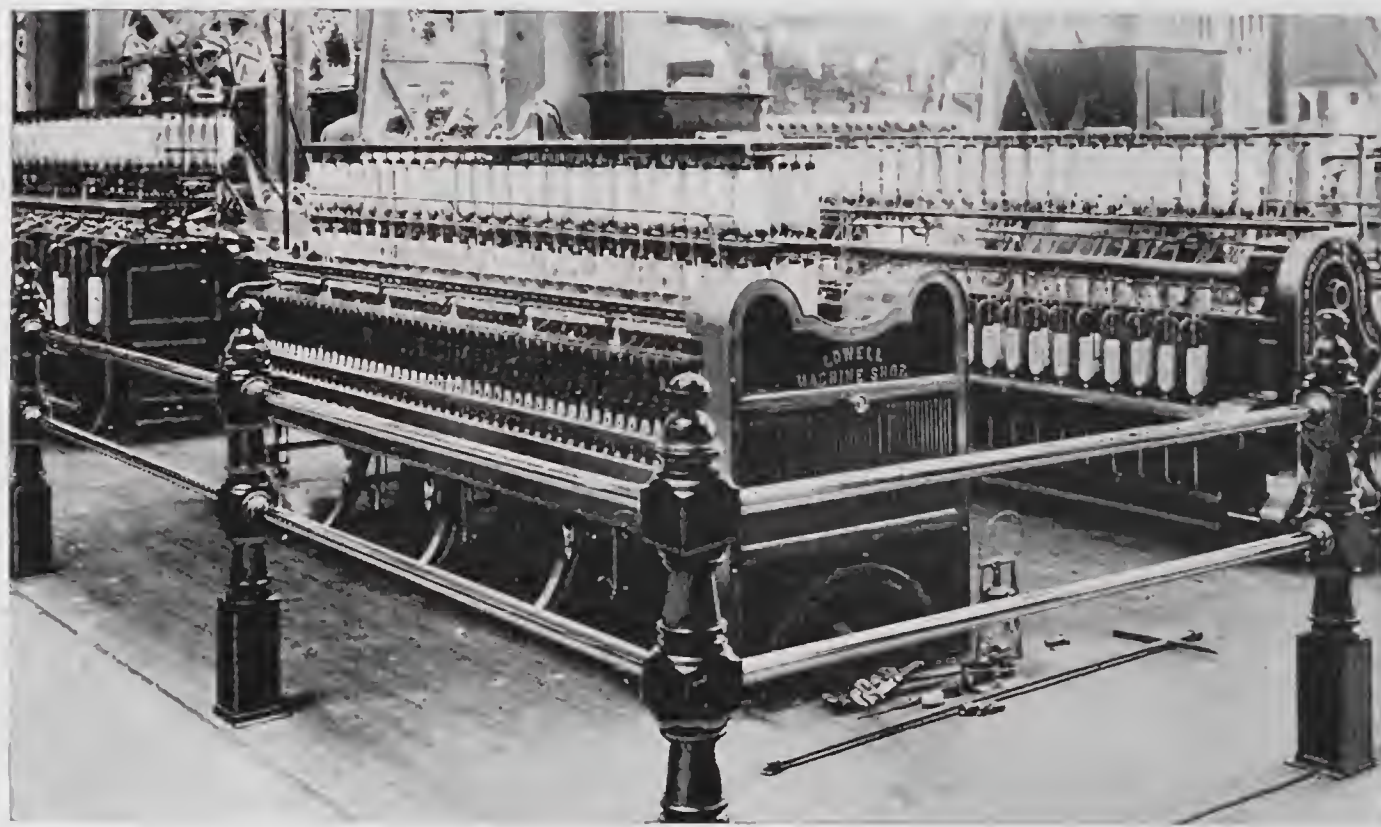
To describe all the workings of these looms is no part of my purpose, even were such description practicable; nor would days and weeks of close observation and study unfold to the visitor their manifold intricacies. Swiftly and smoothly they run, while producing the most elaborate as well as the most simple patterns, stopping when they should, and indicating by noisy demonstration when something is amiss, so that the operator would almost seem to be controlled by his loom, and not the loom by its operator. From the upper portion of the machine a mass of film-like threads passes down-

ward in unbroken line, mingling with the warp in complicated and mysterious fashion, while darting alternately, from left to right and from right to left, the shuttles perform their noisy task. As an instance of their rapidity of movement, it may be stated that, in the manufacture of towels of the finer grades, the shuttles pass to and fro more than 100 times over every square inch of their surface, and yet of such towels several hundreds a day can be made by half a dozen looms, with the aid of a single operator. "My days are swifter than a weaver's shuttle," exclaimed the afflicted patriarch; but Job had never seen in motion a modern Jacquard loom.

Silk ribbons are made at the rate of two dozen pieces at a time, and passing from the loom as finished fabrics are wound into rolls by apparatus placed



SWITCH-BOARD

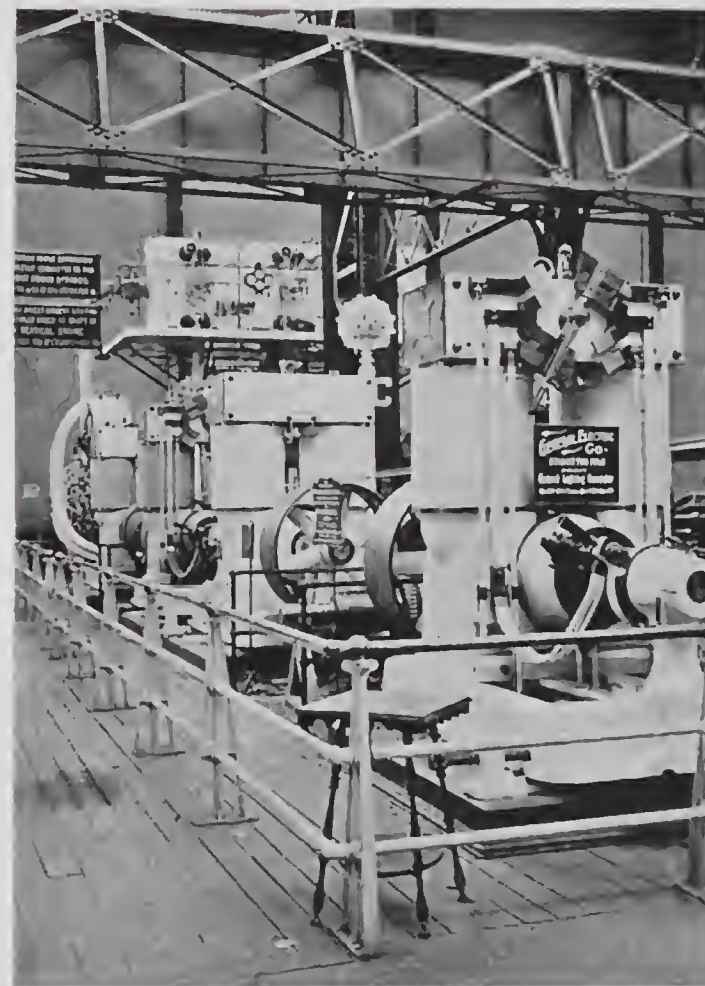


LOWELL COTTON MACHINERY

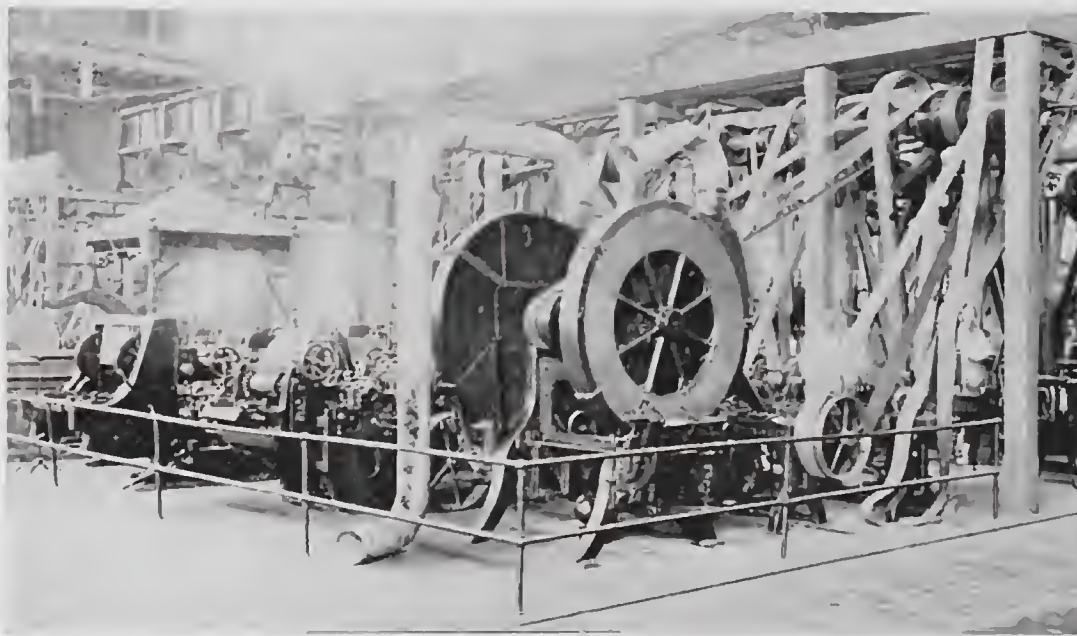
beneath. These are of many patterns, colors, and qualities, the warp displaying all the hues of the rainbow as the threads pass swiftly across the frame. The silk machines are worked by women, all of whom appear to be expert operatives, passing rapidly to and fro, correcting faults and imperfections,

stopping the loom when needed by simply moving a bar at its lower end, and setting again in motion its endless array of threads. In addition to dress silks and ribbons, some of the former in heavy brocades, and the latter with satin finish, souvenir badges, and figured and embroidered handkerchiefs are manufactured by the dozen, with other articles classed under the head of art-weaving.

By the three Worcester firms mentioned as among makers of silk machinery, cotton and woolen

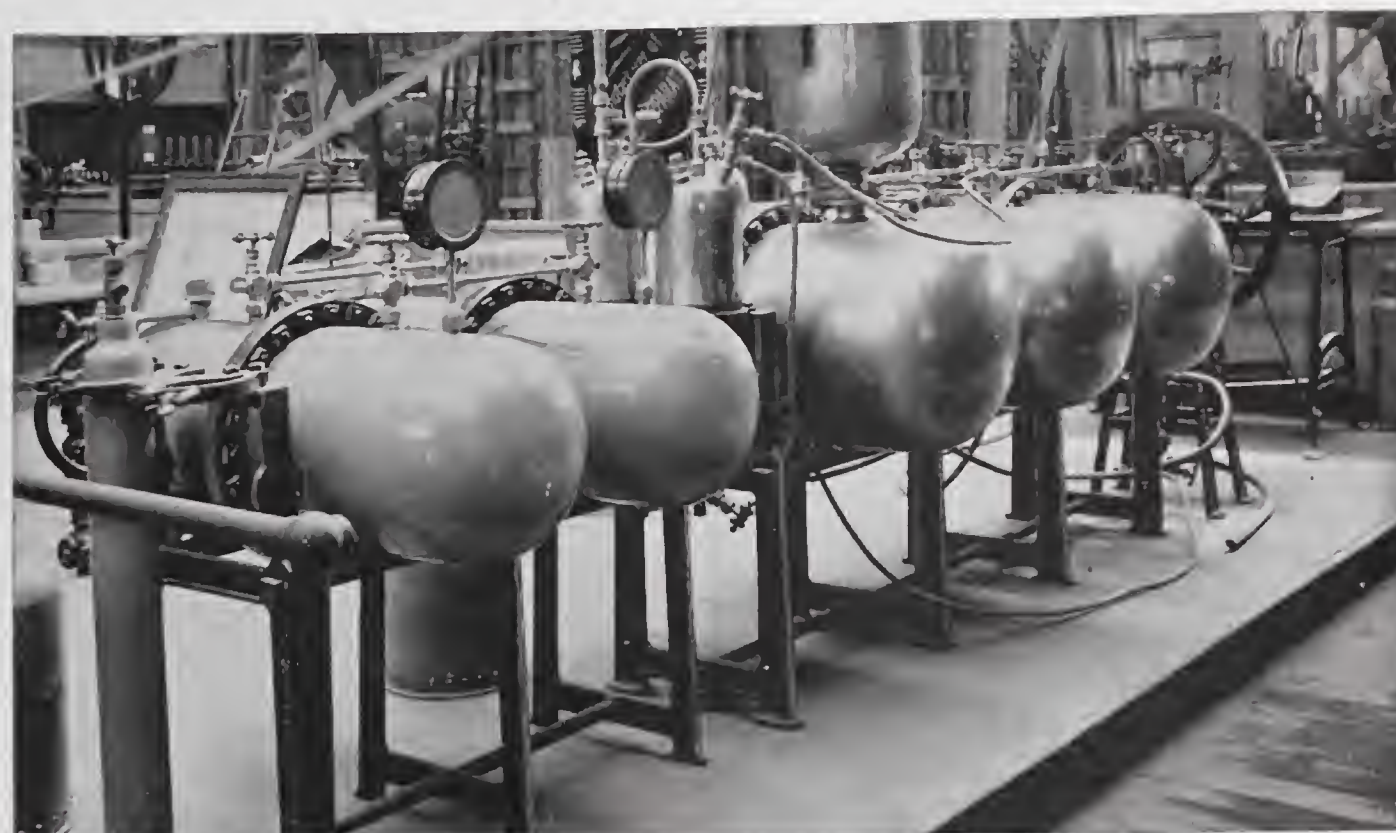


EDISON DYNAMOS

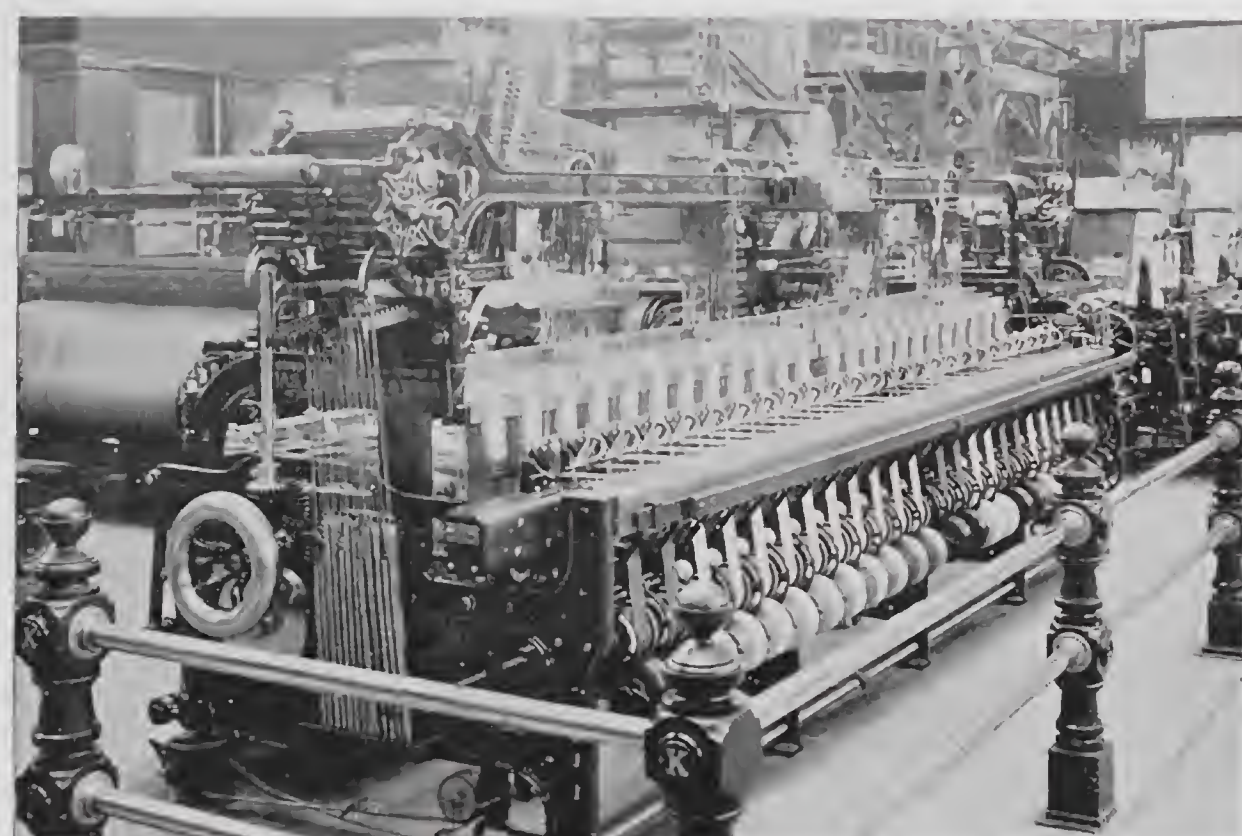


BARREL STAVE JOINTER

looms are also largely produced. Of such as are used for fabrics made partially of cotton there are several collections; Pawtucket, Rhode Island, has a minor display, and the great manufacturing town of Lowell, the Manchester of America, with nearly 200 mills, with 25,000 looms at work, and more than 1,000,000 spindles, is represented at the great World's Fair by a single cotton machine. Yet in the foundries and machine shops of Lowell are produced nearly all classes of apparatus such as is used in her factories. In a miniature cotton mill are demonstrated all the various processes of converting the raw material into finished goods. Cotton, fresh from the bale, is placed in the feeder, where it is freed from refuse, and then smoothed and carded into suitable lengths. Then, after other preliminary treatment, it is woven into fabrics, the spindles moving so rapidly that to the unpracticed eye they appear not to move at all.



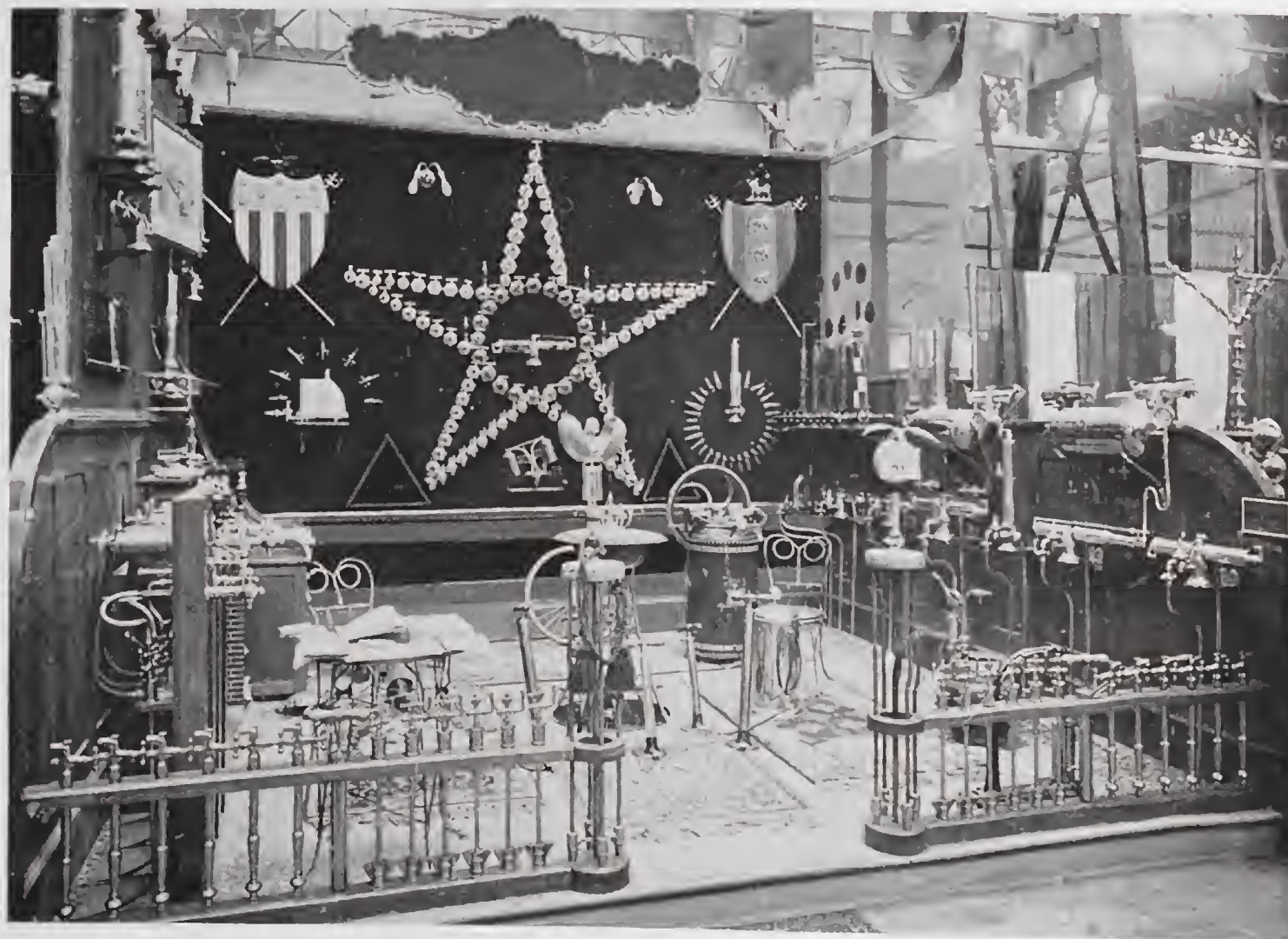
SODA WATER APPARATUS



RIBBON WEAVING LOOMS

moment's cessation. There are also ready wound bobbins for sewing and other machines, with balls of thread for various purposes; there are threads of all sizes and colors in the form of panels, and pillars, and on a revolving cylinder columns of spool cotton in every hue are being woven together, as by a braiding machine.

Of machines for knit underwear there are several in operation, producing yard after yard of fabric which, with but slight manipulation, is transformed into garments. In contrast with them are two hand machines, turned by cranks, and of primitive fashion. A Philadelphia firm has among its collection an apparatus for making underwear trimmings at the rate of fifty yards an hour. Another Philadelphia



GAUGES AND COCKS

company has hosiery and mitten machines of various sizes. A Chicago company shows some swift-running specimens; but in this department the entire display is far from complete, some of the best machinery and such as is widely used for knit goods being omitted altogether from the group. Other textiles are also in process of manufacture, from jeans and homespuns to the finest of laces and embroideries.

The exhibits of machinery for the production of clothing include such as is used for shoes and gloves; but no shoes are made in Machinery hall, the apparatus being adapted only to lining, cementing, heeling, and certain finishing processes, as the making of button-holes. Glove-

making is shown in all the stages whereby a

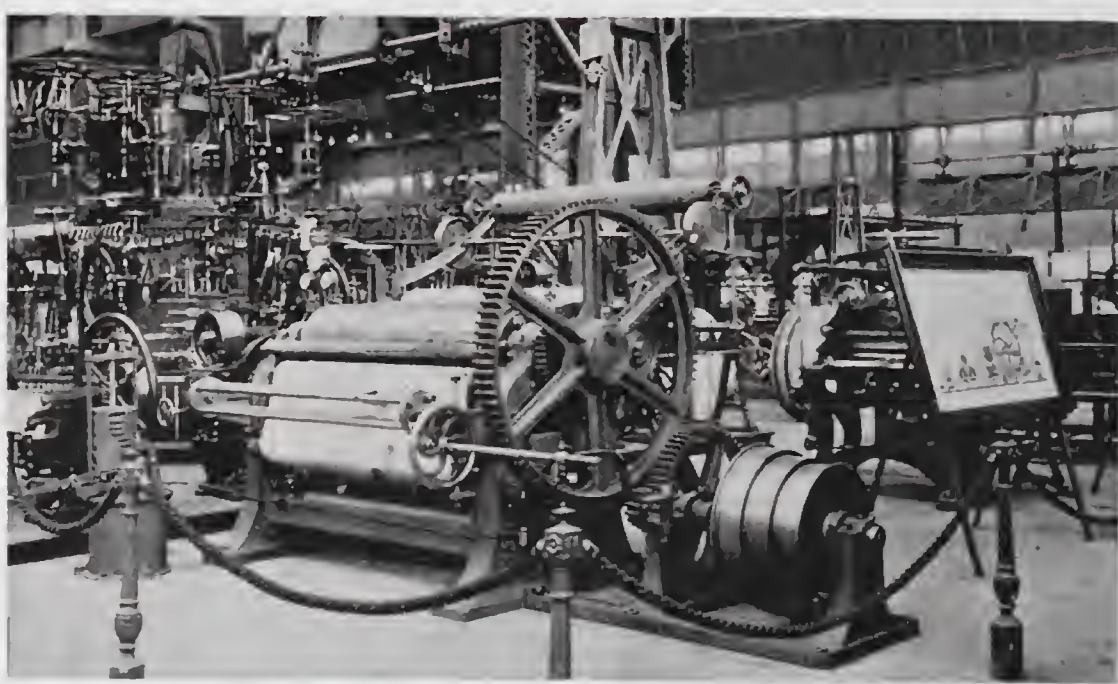
piece of tanned skin is converted into a pair of many buttoned kid, carefully stitched, perfumed, and packed, in readiness for use. There are also machines for belt-lacing, for working hides and leather, for harness, saddlery and whips, for rubber stamps, and felt goods. Of sewing machines for household and factory use, and for stitching leather and other heavy materials, there are several collections, but with little of special interest in this department.

Paper-making machinery is included, as I have said, among textile apparatus, and here may be observed the process whereby wood pulp is transformed into bulky rolls of paper ready for the printing-press. The pulp is made from spruce logs, cut into suitable lengths, ground, and mixed with sulphite, to

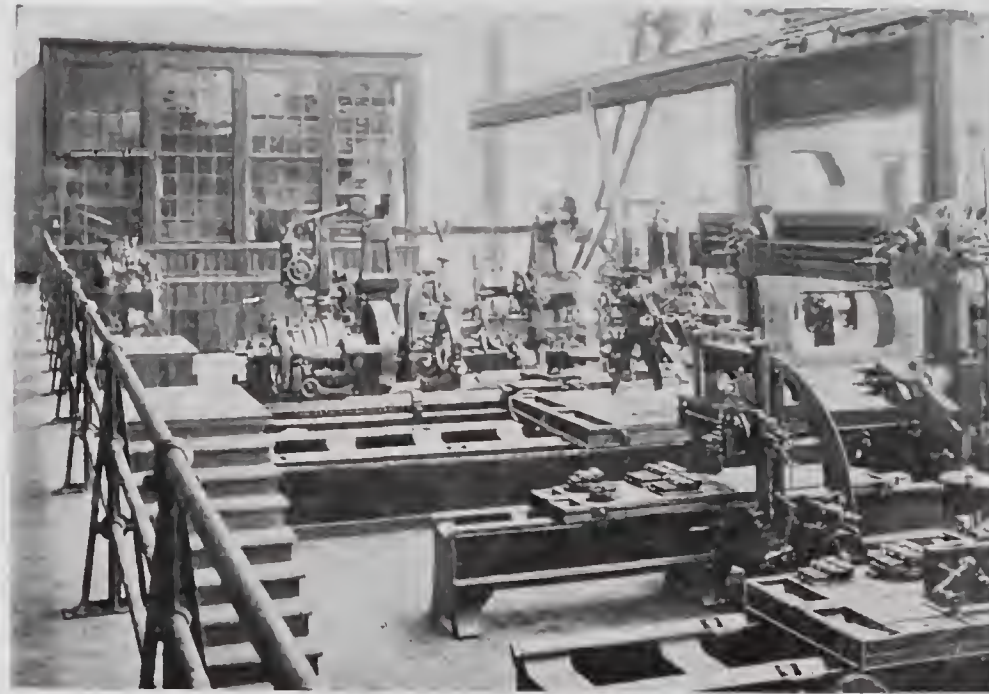


FIRE EXTINGUISHERS

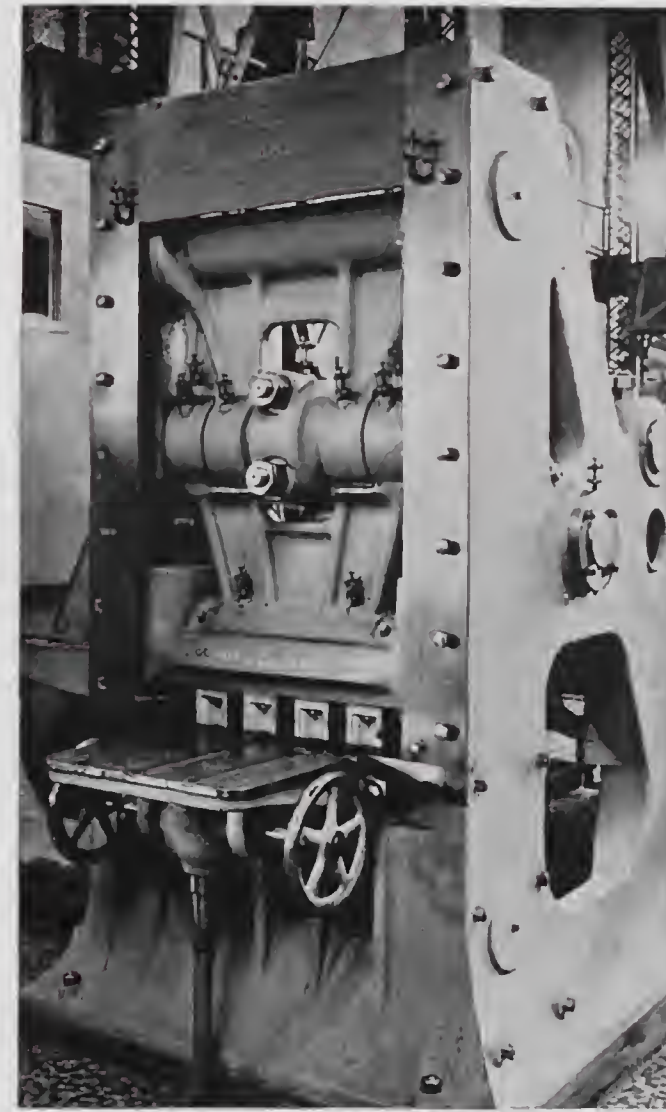
soften the fibre and destroy all deleterious substances. When ready for the mill the material is placed in the beater, and thoroughly mixed with the sizing, coloring, and other matter which enters into the finished product. Then, in a semi-liquid condition, it is drawn off into a storage tank beneath, and presently submitted to a further mixing and grinding operation performed by a so-called perfecting machine. As yet, however, the paper is anything but finished, resembling somewhat curdled cream, but of whiter complexion, and only after much further manipulation, which need not here be described, is ready to receive on its surface the news of the world.



FRENCH PRINTING PRESS



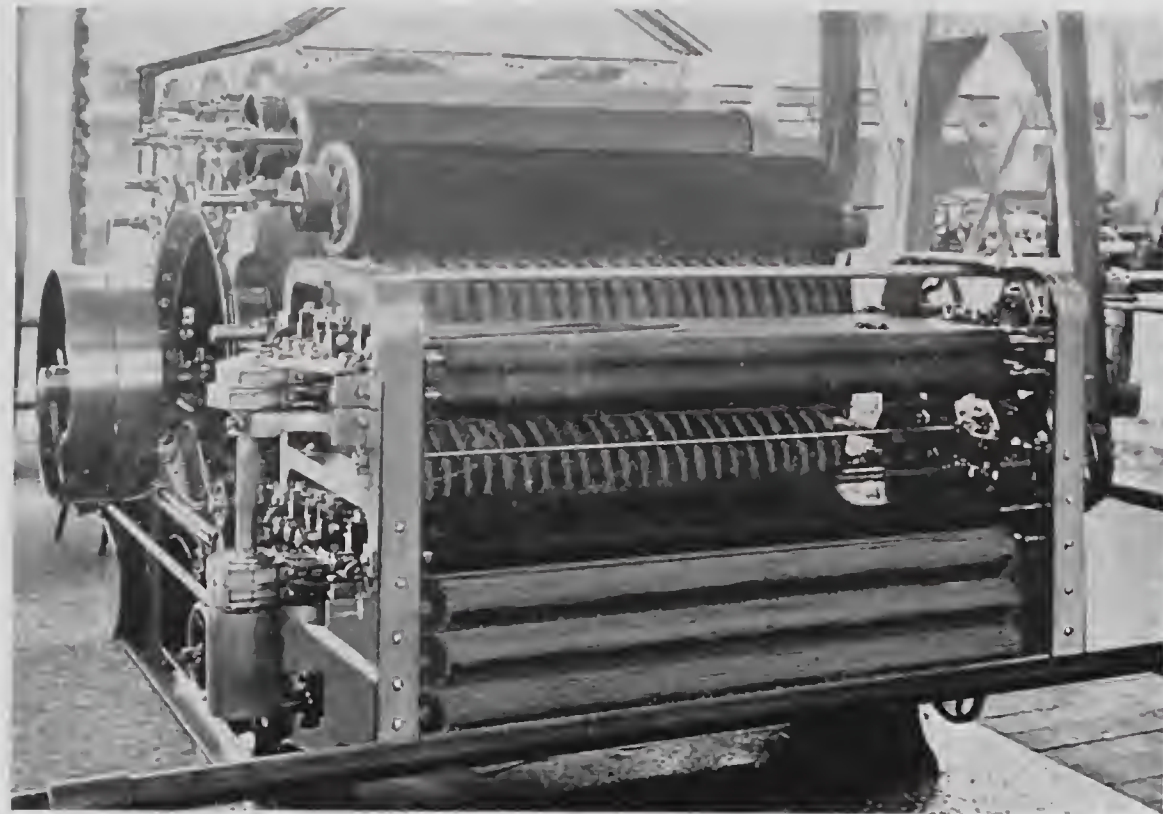
MODEL MACHINE SHOP



BRICK PRESS, CANADA

In this machine, fashioned at the Beloit Iron works, with a capacity of ten tons of paper a day, and occupying more than 100 feet of longitudinal floor space, are contained nearly 200 tons of steel and iron.

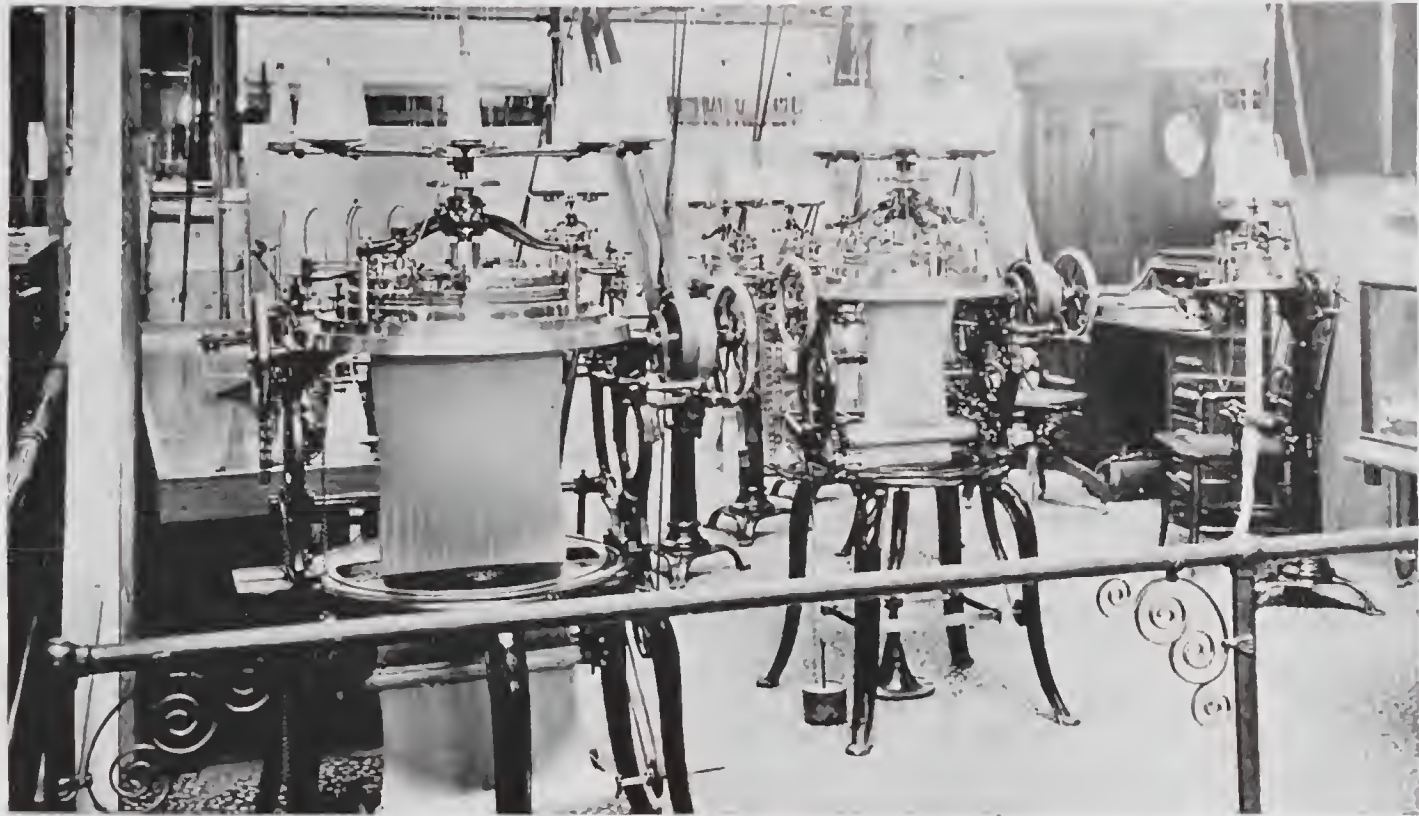
Nowhere better than in Machinery hall, and especially in the textile group, can the visitor study the industrial phases of factory life. Here may be seen at work operatives of the better class in the leading branches of manufacture, men and women working side by side in producing the countless articles for use or ornament which grow into shape before the eyes of the observer. While attending to their several tasks they are always ready to answer questions or to offer brief explanations, the latter, however, too thickly interlarded with technical phrase to throw much light on the subject;



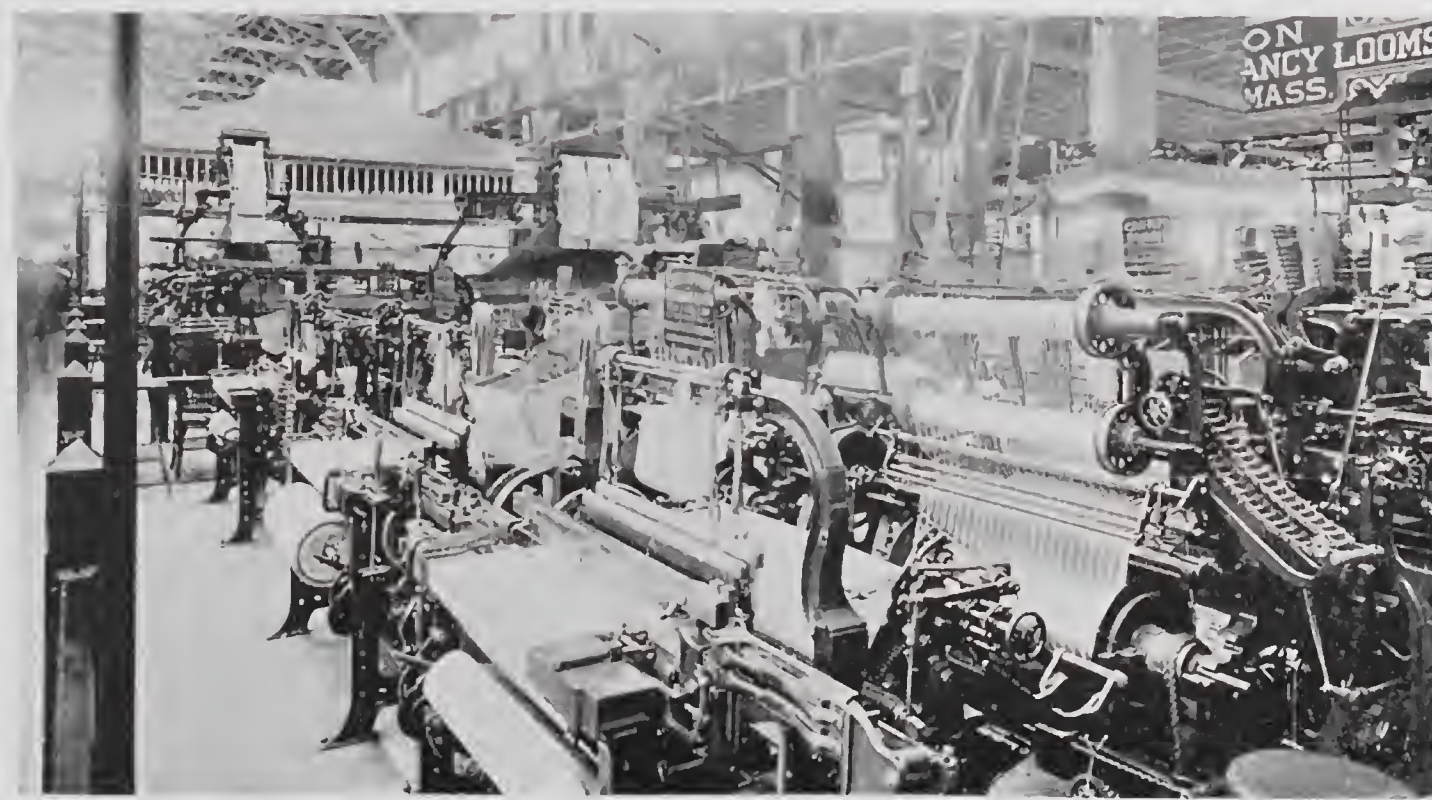
WEAVING LOOM

contrast with the swift-running presses of to-day, turning out their thirty-two page newspapers at the rate of 12,000 an hour, is this ungainly relic of a by-gone age, with its angular wooden frame, its rusty crank, and its long old-fashioned slide, the structure creaking and groaning under its task of printing on one side some 300 miniature sheets an hour, each twelve by sixteen inches. A still more ancient specimen is the original Bradford press, the first one used in New York, with a model of the pioneer printing-office established in that city by William Bradford, on the 15th of April, 1693. Here also is the first printing-press used in New Hampshire, made by one Thomas Draper of Boston in 1742, later used by the state printer, and after other changes of ownership passing into the hands of its exhibitor, the Campbell Printing Press Manufacturing company. Among other curiosities is an old

Ramage press exhibited by a Chicago company, together with samples of its type-casting machines. Side by side with these primitive appliances are marvels of printing mechanism, into one side of which the paper passes fresh from the roll in long unbroken line, and from the other comes forth in the form of printed and folded journals, at the rate of many thousands an hour.



KNITTING MACHINES



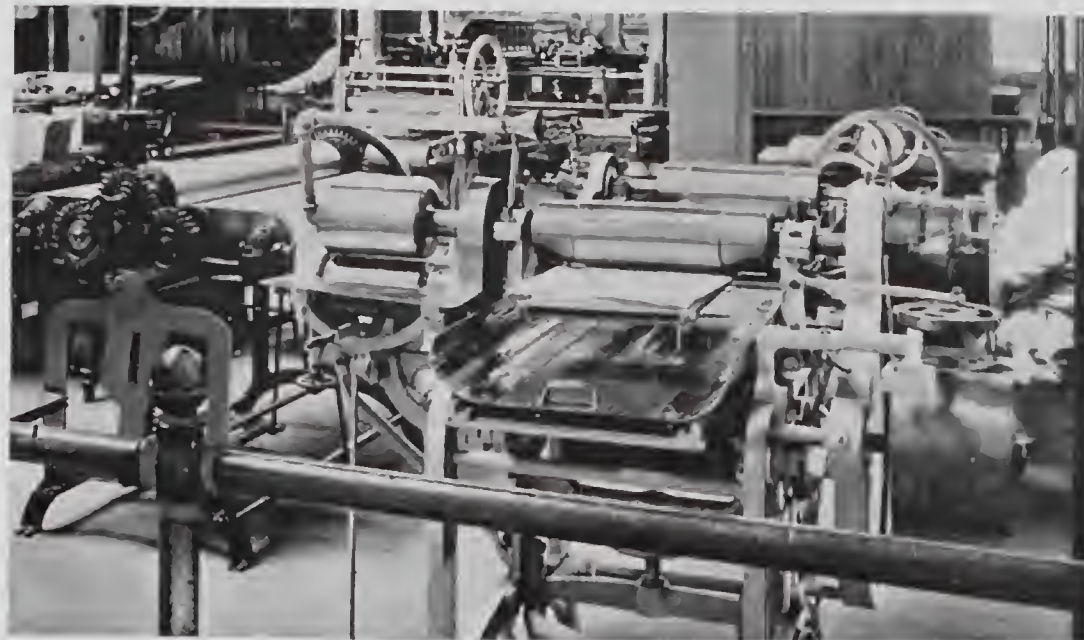
COTTON AND WOOLEN WEAVING LOOMS

for what seems to them as simple as the alphabet is to the average spectator a labyrinth of mysteries. Nevertheless one may learn as much from these miniature mills and factories as by making a tour of the manufacturing centres of the United States.

Extending along the northern aisle and adjacent to the textile group is the Printing-press row of Machinery hall, where, covering more than 12,000 square feet of space, are presses, type-setting, type-casting, electro-typing, paper-cutting, book-binding, and other apparatus, the first including machines of various designs and dates, from such as did duty in the colonial era to those of modern make. Among the former, and included in the Hoe exhibit, is one of antique fashion, made by the same man, and of the same pattern as that which Benjamin Franklin used while working as a journeyman printer in London. In strange

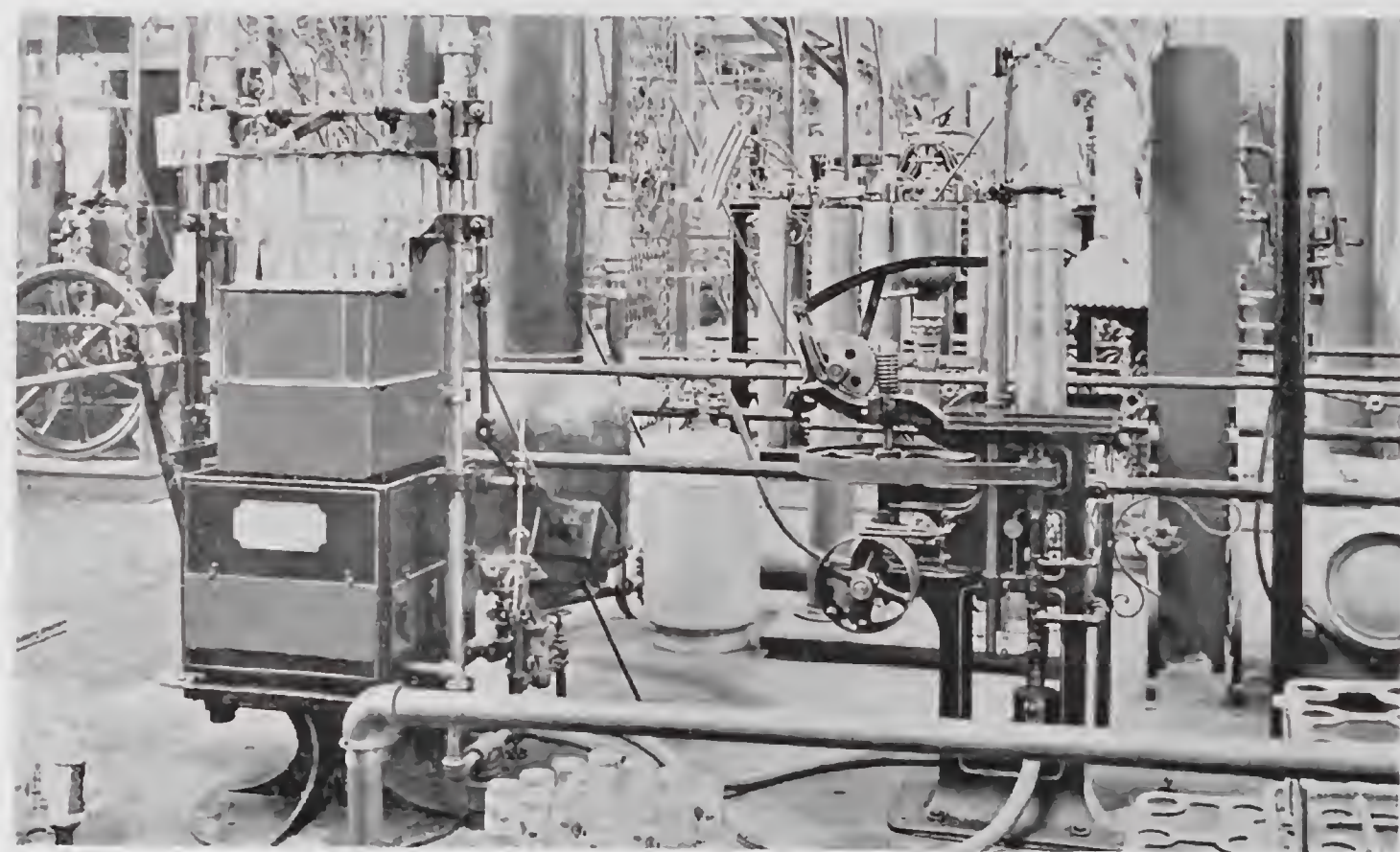
Of printing-presses there is at least a score of exhibitors, some of them including stereotyping, electro-typing, paper-cutting, and other apparatus. Included in this group are samples of all descriptions, from perfecting presses to such as are used for job work. First may be mentioned those of Richard Hoe and company, whose eight and ten-cylinder presses, throwing off 20,000 impressions an hour, and introduced about the middle of the century in New York, Philadelphia, and London, were supposed to represent the final limit of workmanship and speed. Soon, however, in the leading newspaper offices, where time is counted by

seconds, web perfecting presses were reeling off their eight-page journals at the rate of 700 or 800 a minute. One of the highest forms of development is found in the Hoe quadruple web-perfecting press, now largely used by popular newspapers with their mammoth Sunday editions. By this machine a four-page newspaper can be printed and folded at the rate of 90,000 an hour; one of six or eight pages at half that speed, one of from ten to sixteen pages at 24,000, and one of twenty-four to thirty-two pages at 12,000 an hour. Some of these processes may be seen in actual operation in Printing-press row, not only on Hoe machines but on those of the Goss, Potter, and Scott patterns, all of which are here on exposition.



LAUNDRY AND MANGLE EXHIBIT

To the majority of Exposition sight-seers it may not be known that the newspapers laid on their breakfast or dinner tables were printed in Machinery hall; but here we may observe the entire process whereby from these perfecting presses are issued, more swiftly than the eye can count them, the sheets of several Chicago journals. In a separate building, south of the western annex, was installed through lack of space, and as a



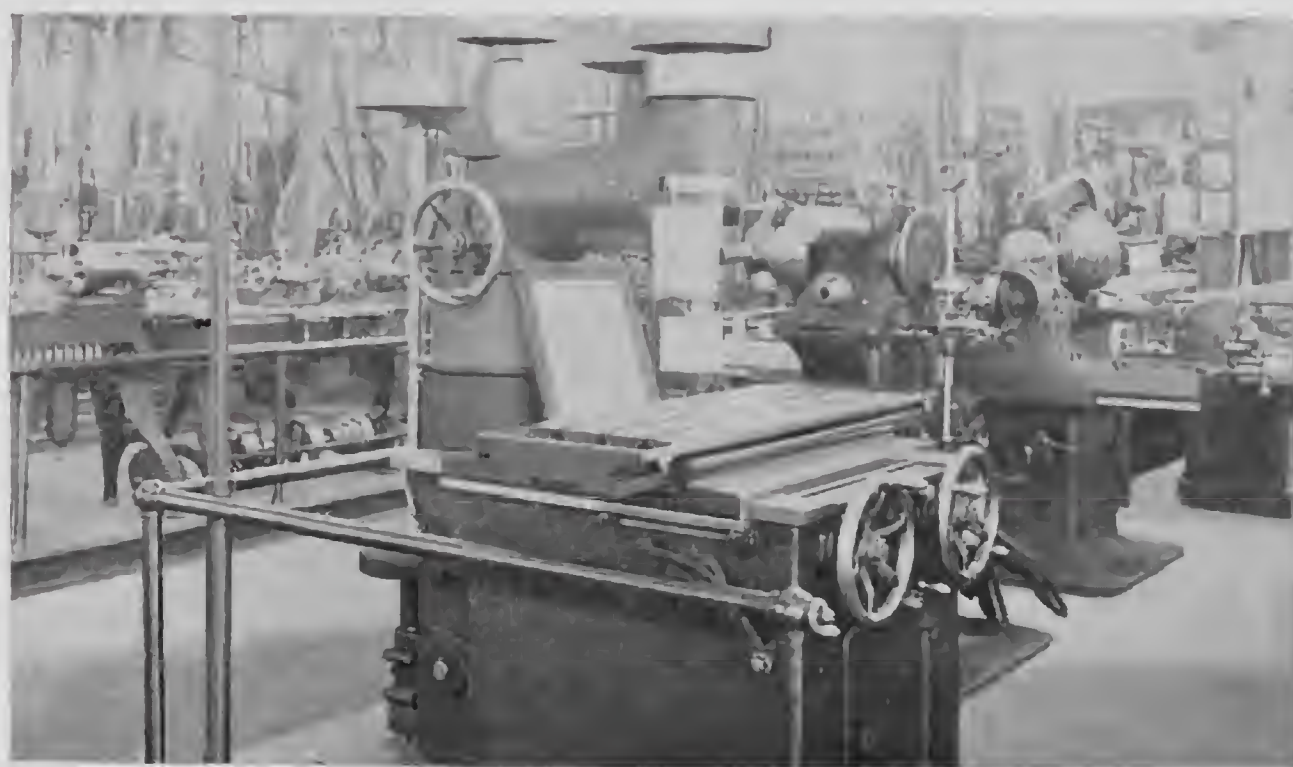
BOTTLE CLEANING APPARATUS

precaution against fire, the electro-typing machinery, forming probably the largest collection ever contained within a single edifice, with complete sets of the most recent and approved apparatus fashioned by leading manufacturers. These are also in actual operation, and thus may be seen how a newspaper is born into the world, from the making of its stereotype plates from papier-maché matrices, until the finished and folded sheets are ready for the newsboy, all eager to disturb with reiterated cry the morning sleep of the Fair pilgrim.

Chicago is well represented in this department by five exhibiting firms, one of them the Goss Printing-press company, three of whose

perfecting presses are here at work. The Miehle Printing Press and Manufacturing company has also a press in operation, of Chicago invention and make, on which is printed the page now before the reader, that is to say *The Book of The Fair*, the type for which came from Barnhart Brothers and Spindler, who are likewise among Chicago exhibitors. The remaining exhibits are from New York, New Jersey, New England and mid-continental states. Barnhart Brothers and Spindler and the American Type Founders' company illustrate the evolution of type-foundries. First is the primitive apparatus in the form of a hand-mold, made in 1793; then one with rotary motion, of the date of 1840; another worked by steam and fashioned in 1870, and finally the perfected mechanism of 1893. Of type-setting machines there are several exhibits, one firm displaying also a type-line casting machine, and of printers' materials and miscellaneous appliances there are one or two assortments.

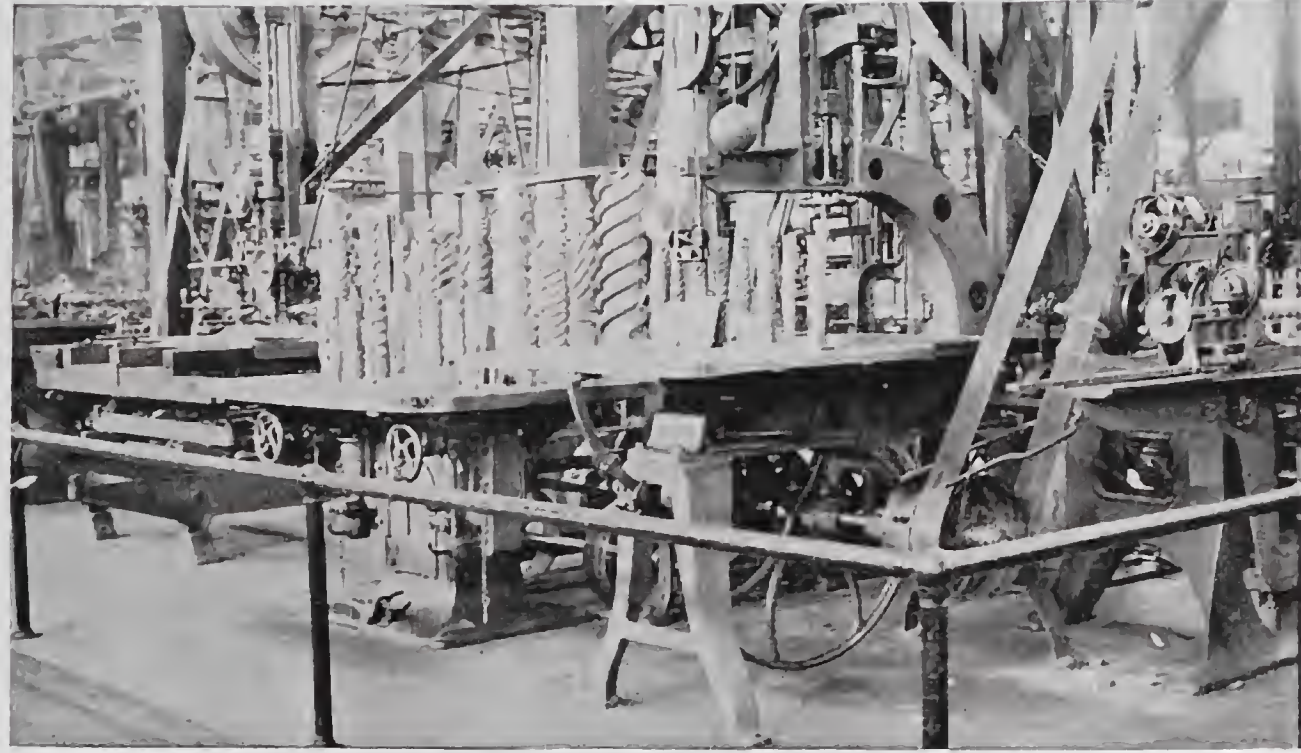
Of paper-cutting and paper-folding apparatus there are many specimens, and among the former may be seen at work some of the largest machines of their kind, run by heavy leather belting, and requiring only a turn of the wrist to cut through a ream of the thickest



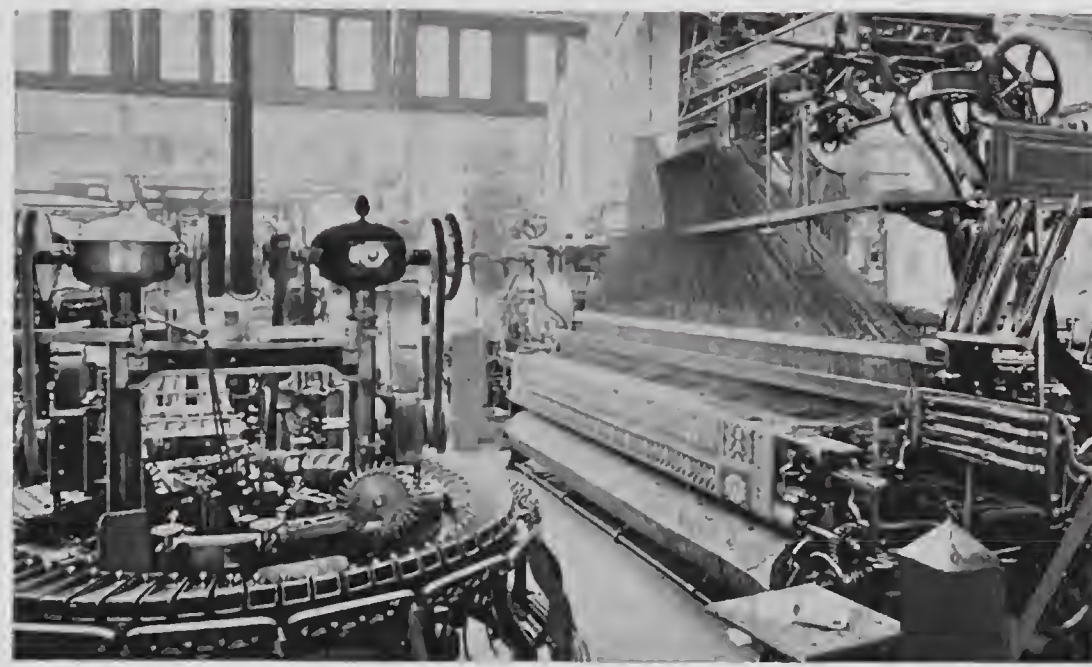
CHUCKING MACHINERY

paper as though it were a roll of butter or a mass of lard. The latter are used both for book and periodical work, with hand or automatic feed, and with all the improvements devised since first the folding-machine was introduced in the United States, some forty years ago. By a firm whose headquarters are at Little Falls, New York are displayed its paper-working appliances, such as are attached to ruling and folding machines and printing-presses. Of book-binding and book-sewing machines there are several exhibits, the latter both for thread and wire stitching, and there are a few embossing and inking machines, some of them performing all grades of work with equal facility.

Few in number, but of excellent quality, are the exhibits illustrating the various methods of lithography, color-printing, and other processes, partly chemical, and partly mechanical, which have been devised as substitutes for the productions of the brush, the pen, the pencil, or crayon. By a New York firm are displayed its lithographic distribution presses, and by Chicago exhibitors a multi-color process, and a duplex color ink-plate for printing-presses.



WOOD WORKING MACHINERY



ART SQUARE LOOM

In the group of machinery for working in wood, separated from the textile section by the main longitudinal nave, is sufficient evidence of the rapid progress which recent years have witnessed in this department. But the limit has not yet been reached or even approached, and in few branches of mechanical invention are there greater possibilities. The turning-lathe, for instance, which a few years ago could only be used for shaping wood into rounded forms, will now give to it many varieties of outline, from square to spiral, and from oval to polygonal. So also with machines used for carving, stamping, molding, tonguing, and mortising lumber, and for all the various operations in which machinery does

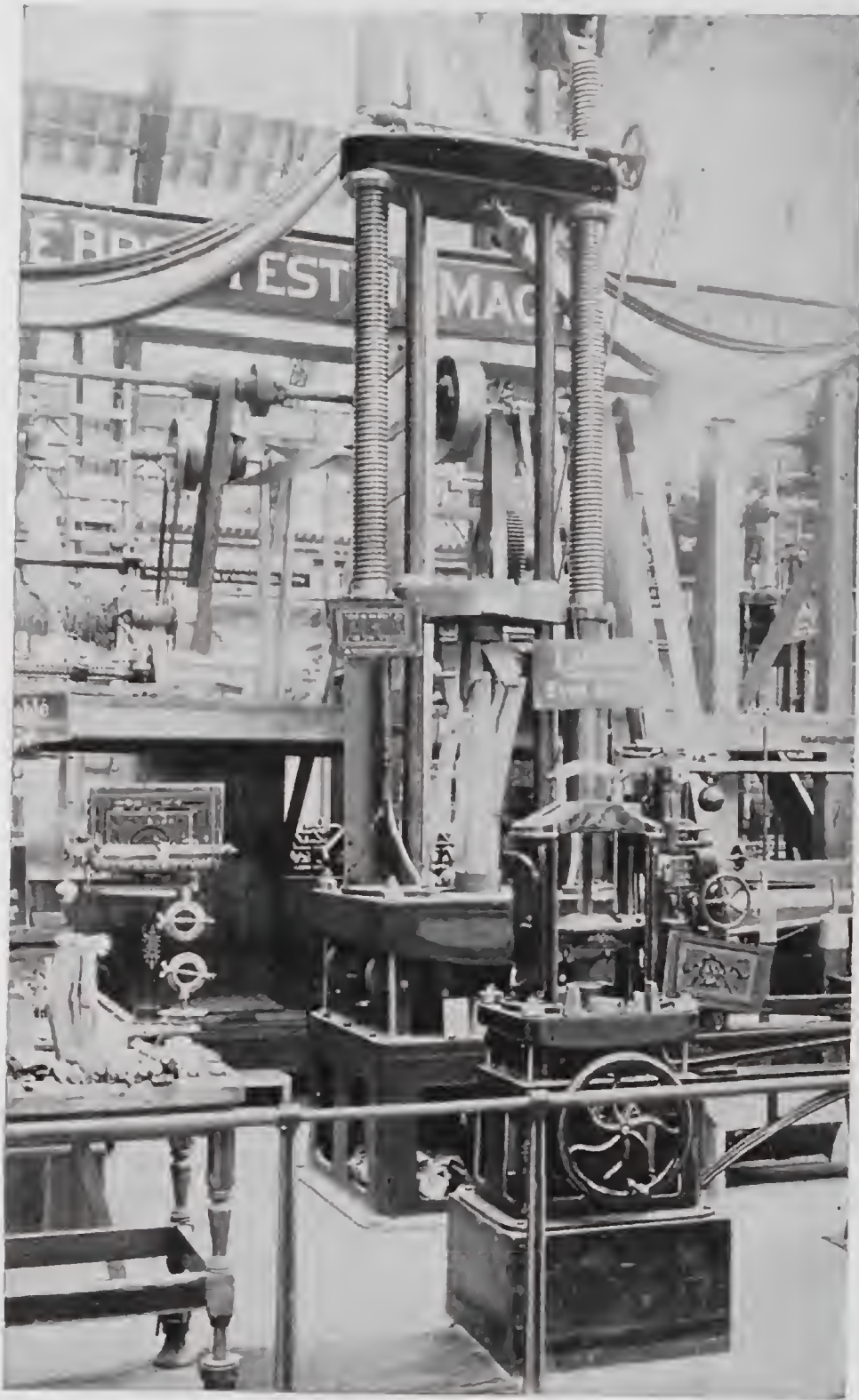
the work that was formerly done by hand. Yet in each of these processes there is still much room for improvement.

Among the more remarkable exhibits is one by a Pennsylvania manufacturer, in the form of a so-called geometrical machine. While not altogether new, there are few of this pattern in use in the United States; for here is a mechanism that can only be handled by the most skilful of mechanics, one producing perfect specimens of workmanship, and in all such figures in solid geometry as avail for practical use. A New York firm has special machines for the manufacture of the woodwork used in pianos and organs. Dubuque sends a swift-moving chain mortiser, in which chisels are entirely dispensed with, the chain revolving on pulleys of graduated sizes according to the width of the mortise. Among other mortisers of special pattern is one used by a Chicago firm whose specialty is in the line of car-building machinery. By its carriage attachment of iron, moving on rails, and by the iron rollers on the upper part of the machine is greatly facilitated the handling of heavy lumber. The same firm shows a double mortiser, mainly for door-work, an almost perfect specimen of labor-saving machinery.



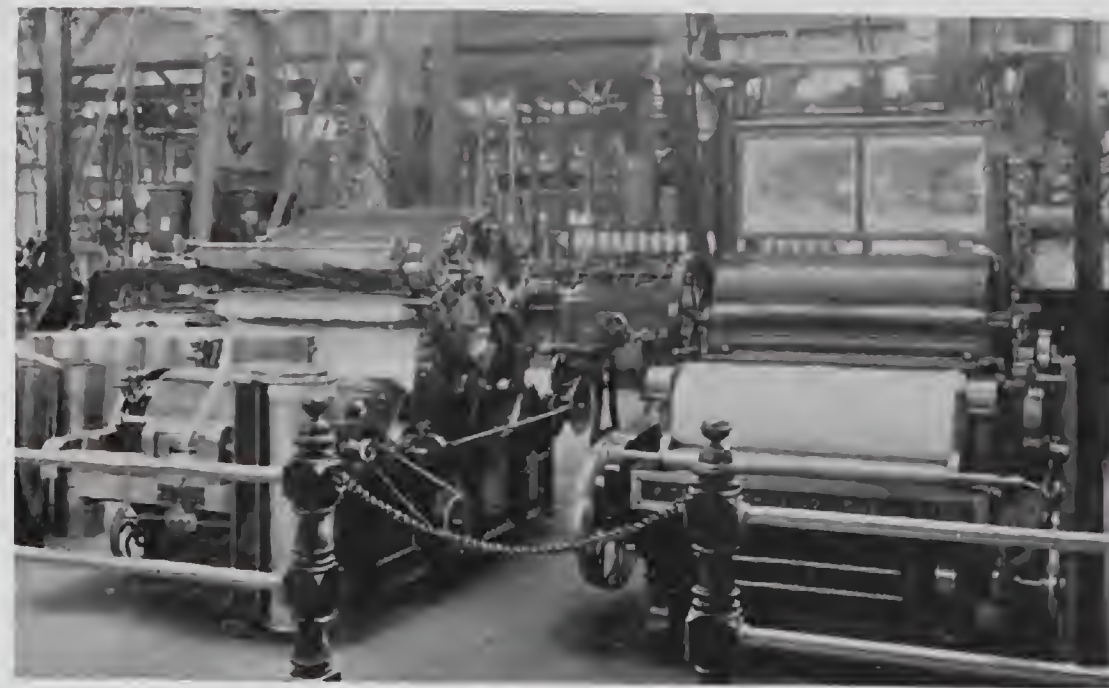
VERTICAL SPINDLE MILLING MACHINE

A Cincinnati manufacturer displays a matcher of improved design, with stationary bed, and of which the



RIEHLE TESTING MACHINE

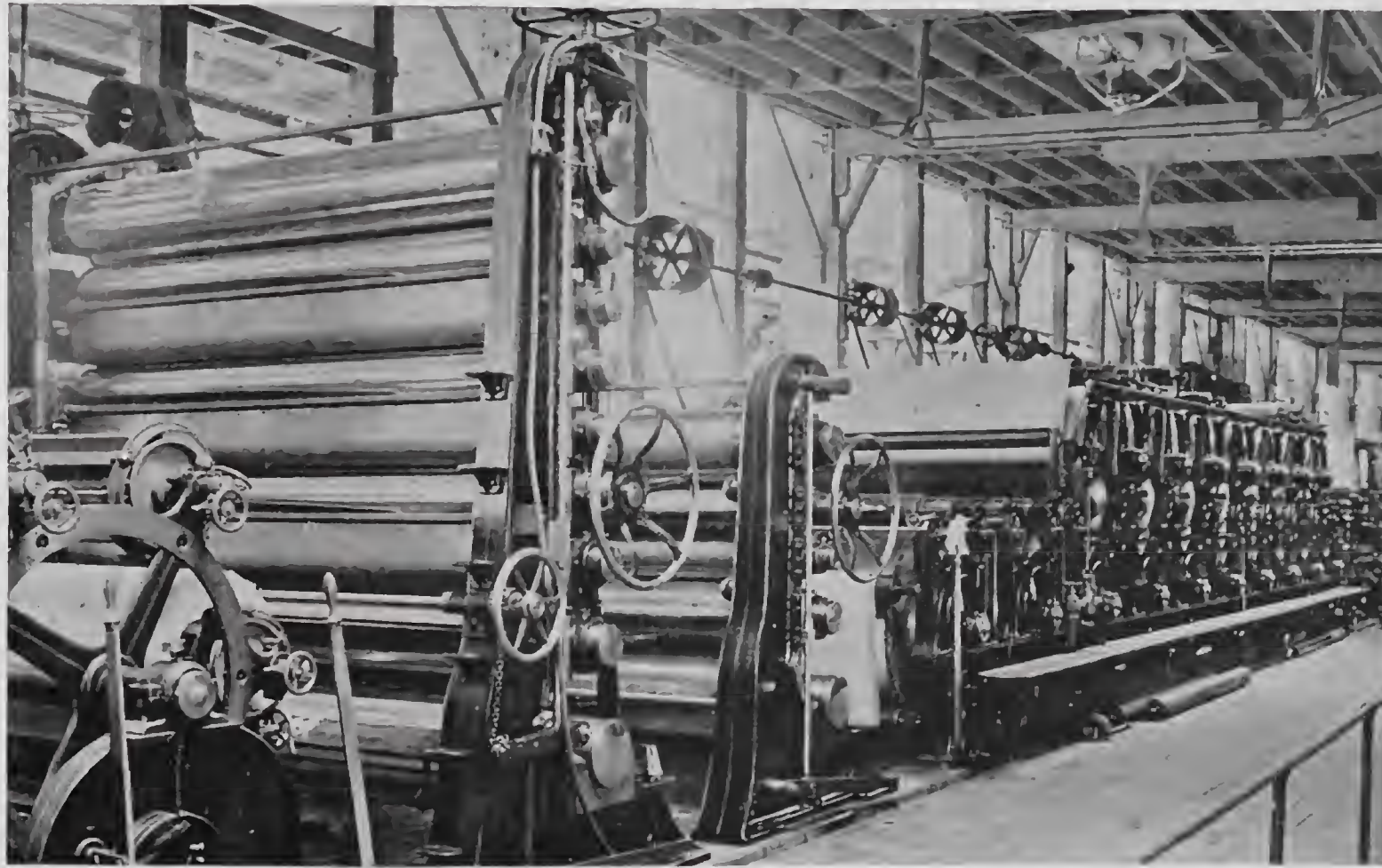
heads and rollers can be raised or lowered, and the pressure increased at will by an automatic process. From a Boston firm comes a matcher and molder of similar pattern, but with improvements permitting greater facility in working. Buffalo shows a planer which will work on the four sides of a piece of timber. Somewhat of a novelty is an ingraining machine from Hutton, Pennsylvania, whereby white-faced woods, as pine, spruce, maple, birch, and poplar are transformed into perfect



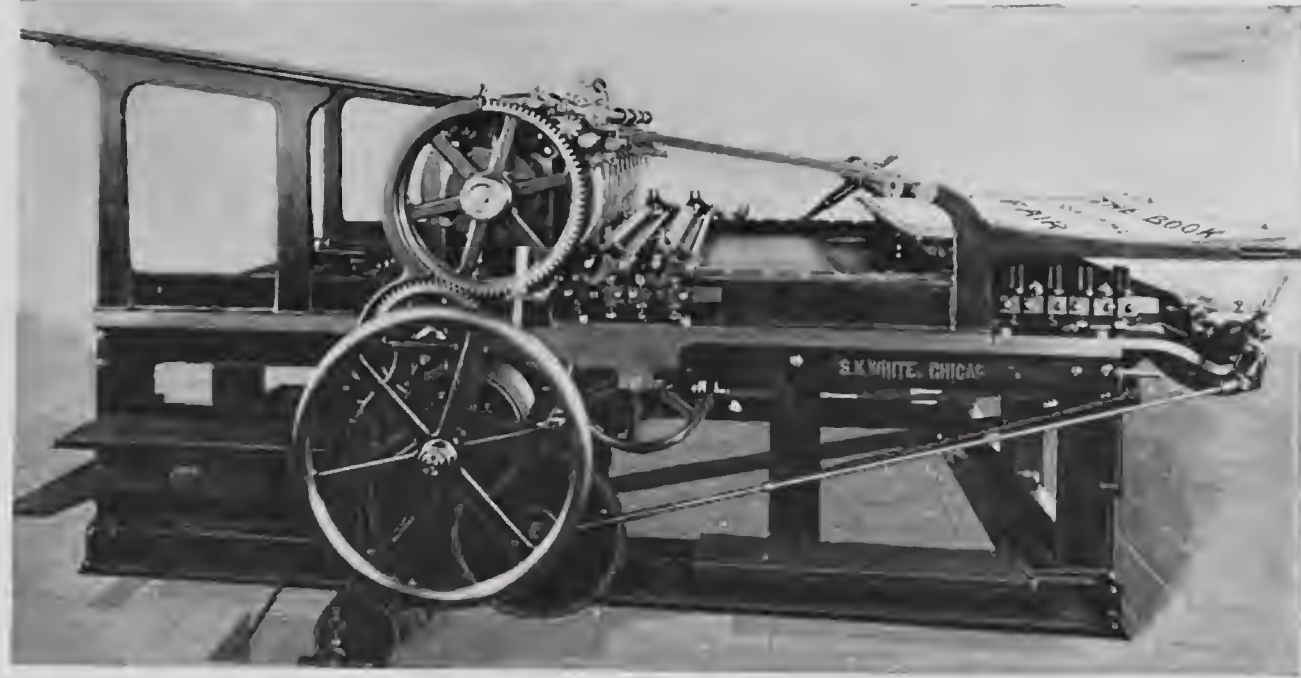
LOWELL COTTON MACHINERY

imitations of quartered oak or other high-priced articles, and thus almost doubled in value. The designs are painted on a drum with thirty-inch face, revolving three times a minute, and capable of treating 6,000 feet of lumber an hour, to which it gives an additional value of about \$20 a thousand, thus earning \$1,200 for each working day. Saws and sawing-machines, files and filing machines are liberally represented, a Fitchburg, Massachusetts, company, established in 1832, claiming to be the largest manufacturers of saws and machine-knives in the

United States, and that its goods are made by distinct and patented processes. In a separate building is a model saw-mill, mentioned under the heading of Miscellany. Of wood-working machinery there are many samples, and among wood-carving appliances are some whose motions resemble those of the human arm. There are also wood-embossing, shingling, barrel-making, box-nailing, pattern-making, and other special apparatus, while a Cincinnati firm has specimens of machinery used in the navy yards of the United States. Although classified together, the machines for working stone, clay, glass, and other materials, and for making spikes and nails are grouped in widely separated portions of the hall. Several firms display their processes of grinding and finishing lenses, and here may be observed the method of manufacturing wire nails. Another miscellaneous class is grouped near the water-tank, in the western sections of the annex. It includes all kinds of dynamometers for testing the strength of materials; the machinery used by jewellers, and opticians, and the laundry and dish washing apparatus. The laundry machines are of ingenious mechanism, and the more simple automatic dish-washers may be seen at work in the annex, and in several of the Exposition restaurants. Several eastern manufacturers have a large collection of watchmakers' tools; in one of these booths are made souvenir thimbles of gold and silver, and



PAPER MAKING MACHINE



THE MIEHLE PRINTING PRESS

mills of all kinds for the preparation of cereals, coffee, and spices, together with bone crushers and models which show how the oil is extracted from cotton seed. Among the most ingenious mechanisms is one for pouring the beans into bags, arranged on a movable plate, and remaining just long enough to receive one pound of coffee, after which they are sealed, labelled, and passed forward for inspection, by means of a travelling belt.

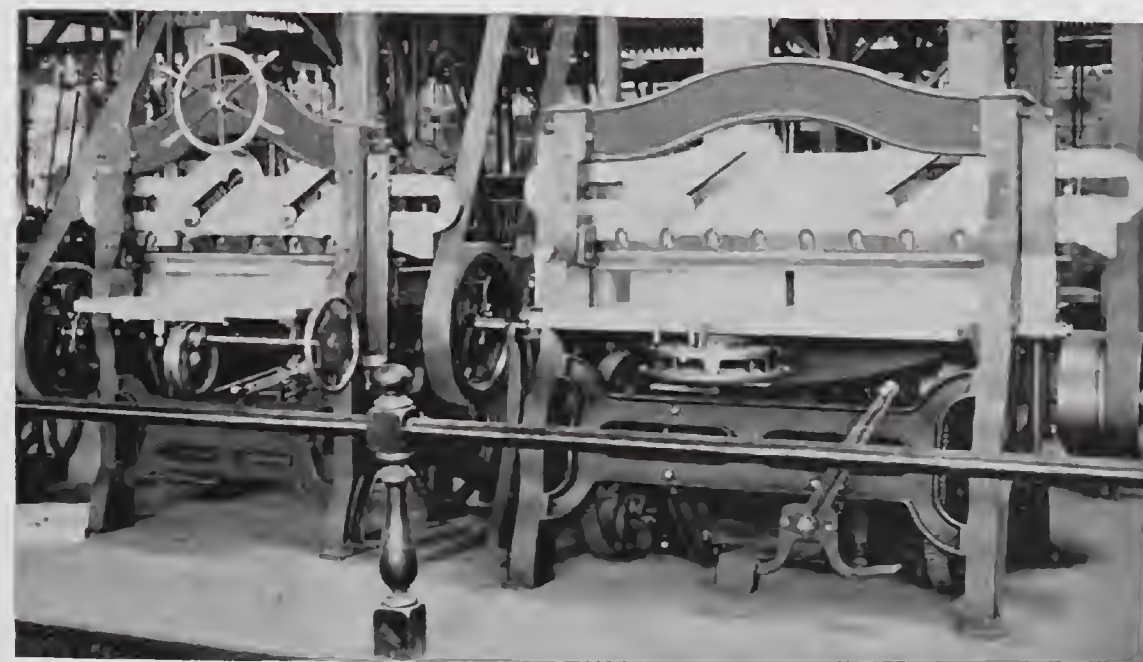
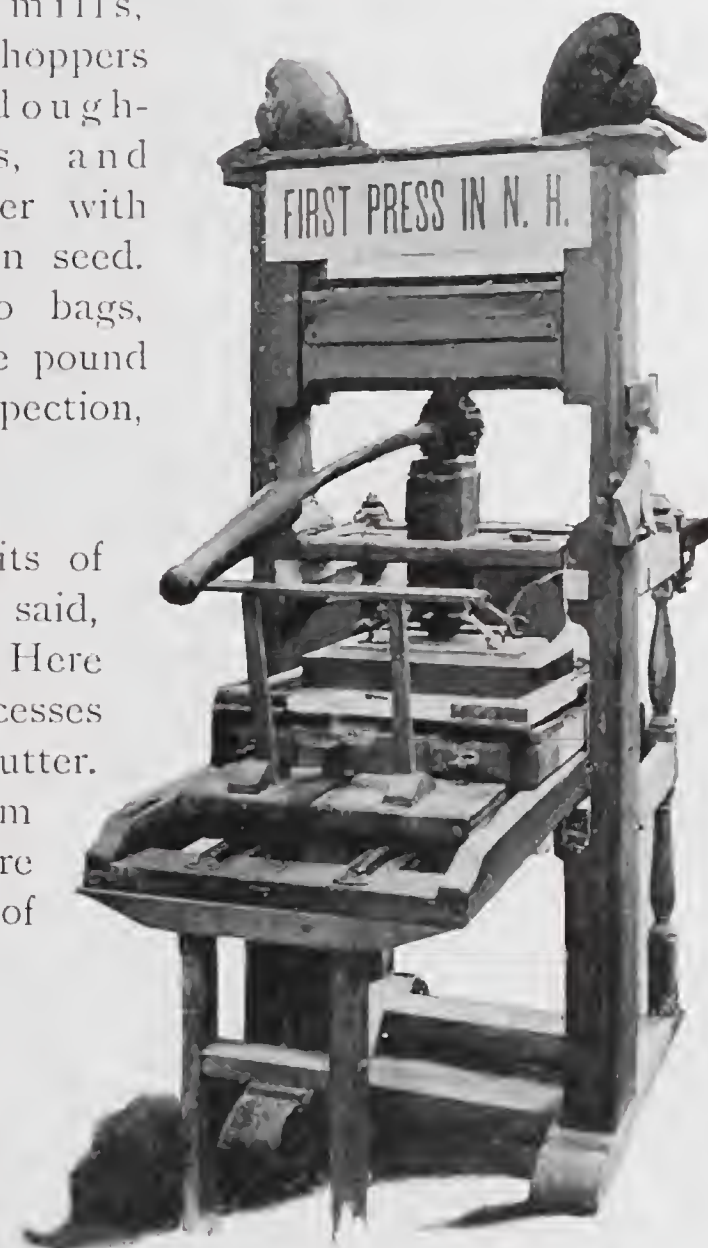
Except for a few specimens contained in Machinery hall, the exhibits of refrigerating apparatus and of ice-making machines were installed, as I have said, in the Cold Storage building, in the south-western portion of the grounds. Here were displayed the various methods of artificial freezing, and the several processes for the preservation of such perishable articles as fruit, meat, eggs, and butter. In the manufacture of ice, filtered water, and condensed and purified steam were the principal materials used. Of this building, and its destruction by fire a description is given at the close of this chapter under the heading of World's Fair Miscellany.

Turning to the foreign sections in Machinery hall we find that, as in other departments, the German groups have been selected and arranged with special care, furnishing sufficient proof, if proof were needed, that the empire is holding its own in the markets of the world. For general purposes this branch of industry, as represented in the Fatherland, may be classed in three divisions; first, the casting of iron; second, the construction of machinery; and third, the conversion of manufactured iron into structural forms. Year by year these industries are assuming larger proportions, and while gaining in volume are gaining far more in quality. Of castings alone there were produced in 1890 more than 1,000,000 tons, keeping busy 1,150 establishments, and affording employment to 64,000 operatives. In the production of machines and apparatus of all descriptions at least 200,000 persons were employed, with exports for that year exceeding 80,000 tons, and valued at nearly \$20,000,000.

Passing through the northern portal of the hall the visitor enters at once the German section, occupying



TYPE-SETTING MACHINE

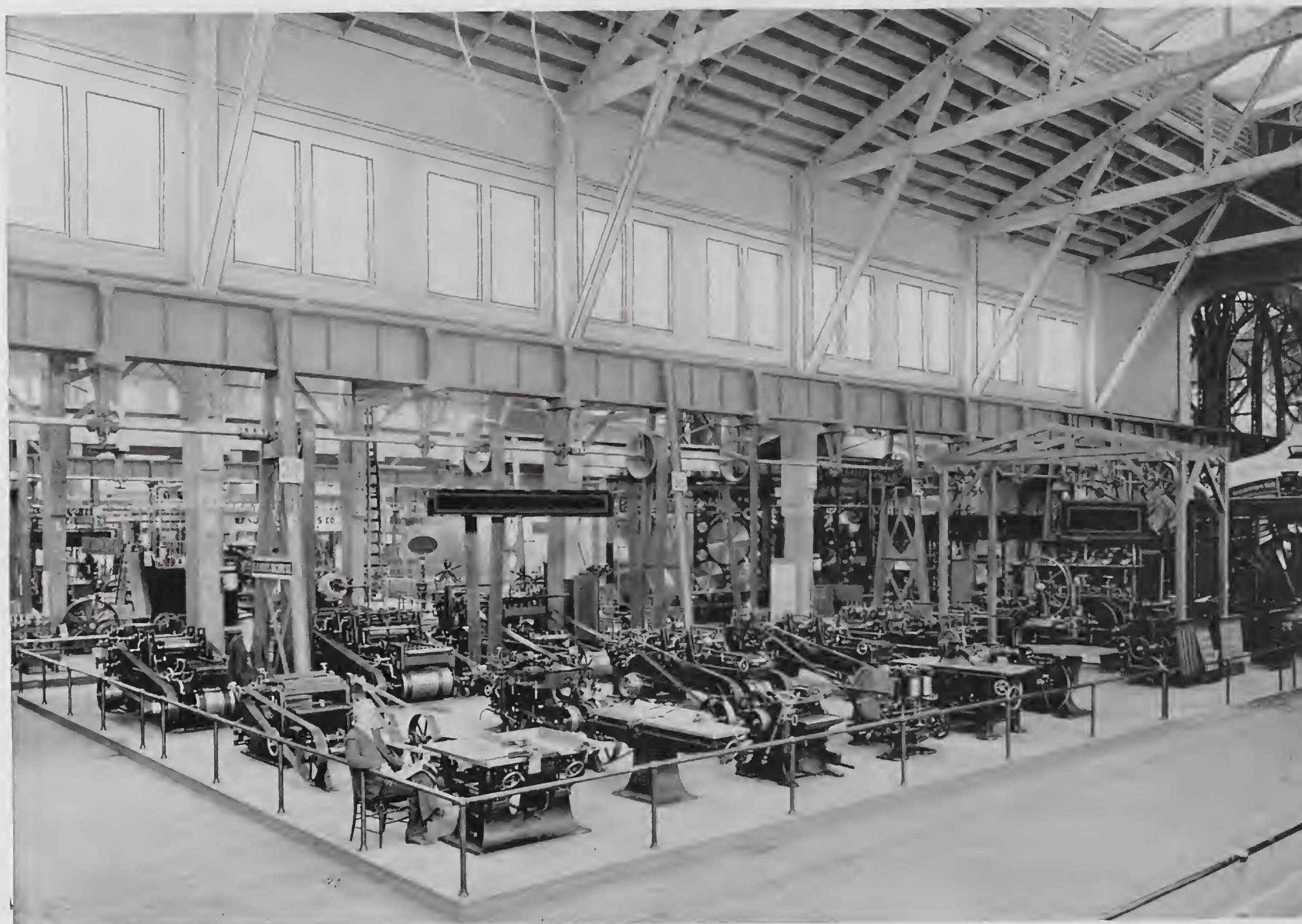


SELF CLAMPING PAPER CUTTING MACHINE

in the main hall a Chicago company displays its method of manufacturing pens. To the miscellaneous classes also belong the exhibit of road-making and street-cleaning machines, placed outside the building.

In the northwest corner of the annex is a collection of apparatus for the preparation of various articles of food. In one large pavilion a Milwaukee manufacturer has an extensive display of flour-mill machinery, and by an eastern firm are exhibited portable flour-mills. Then there are chocolate and sugar mills, meat-choppers and dough-mixers, and

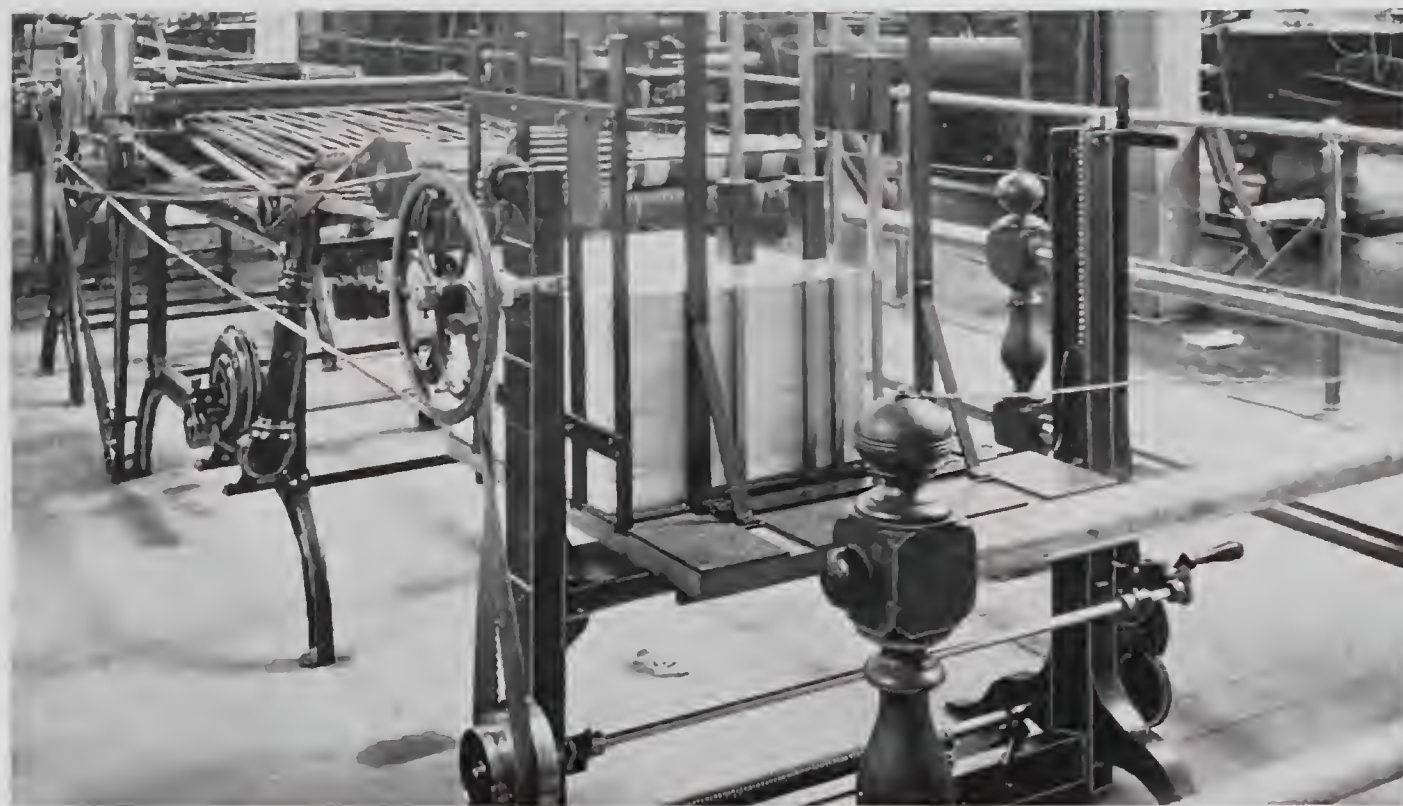
50,000 square feet of space, and flanked by the British division. But here are contained only portions of the German exhibits, agricultural implements, mining apparatus, locomotives, dynamos, and other machinery being housed in the various departments to which they belong. At the intersection of the main aisles is a triple expansion engine, connected with a dynamo, for illumination purposes, and for the transmission of electric power. This engine, built by an Elbing manufacturer in western Prussia, is of 1,000 horse-power, its frame entirely of wrought iron, its stroke of 28 inches, and its revolutions at the rate of 100 to the minute. At its side, is a smaller engine, forming its counterpart in miniature, and used for driving a portion of the shafting in Machinery hall. Adjacent to this group are the gas and petroleum engines, the largest not exceeding thirty-five, and the smallest of three horse-power. As in England, these machines are rapidly gaining in favor, and of especial excellence are those of German make. By one of the exhibiting firms, employing 1,000 workmen, and with a branch factory in Philadelphia, have been produced some 40,000 engines, since their works were opened in 1864, as the pioneer enterprise in this department, now protected by patents in many countries.



WOOD WORKING MACHINERY

East of these exhibits is that of a Leipzig firm, whose specialty is the manufacture of sawing-machines and machines for working in wood, of which their 600 workmen have already produced some 24,000 specimens. Here is reproduced what is claimed to be the largest saw-mill in existence, but one that appears somewhat crude as compared with American models, and with few of the time and labor-saving devices contained in the latter. In charge of expert workmen is a large collection of apparatus in actual operation. Still further east a Düsseldorf factory, with a branch establishment at Pittsburg, has a display of machine-tools and saws of all sizes and patterns, from hand, jig, and circular saws, to such as will cut the thickest armor plate. One fashioned for the latter purpose is more than four feet in diameter, with teeth half an inch thick, and of the hardest steel. In the north-east corner of this section another Düsseldorf firm shows its machines for making armor and hand-chains, with wire-nail, riveting, and other presses. At the western extremity a Nuremberg manufacturer exhibits fine wires of brass, steel, and German silver, some of them in skeins as delicate as silk, with wire brushes for household and other purposes.

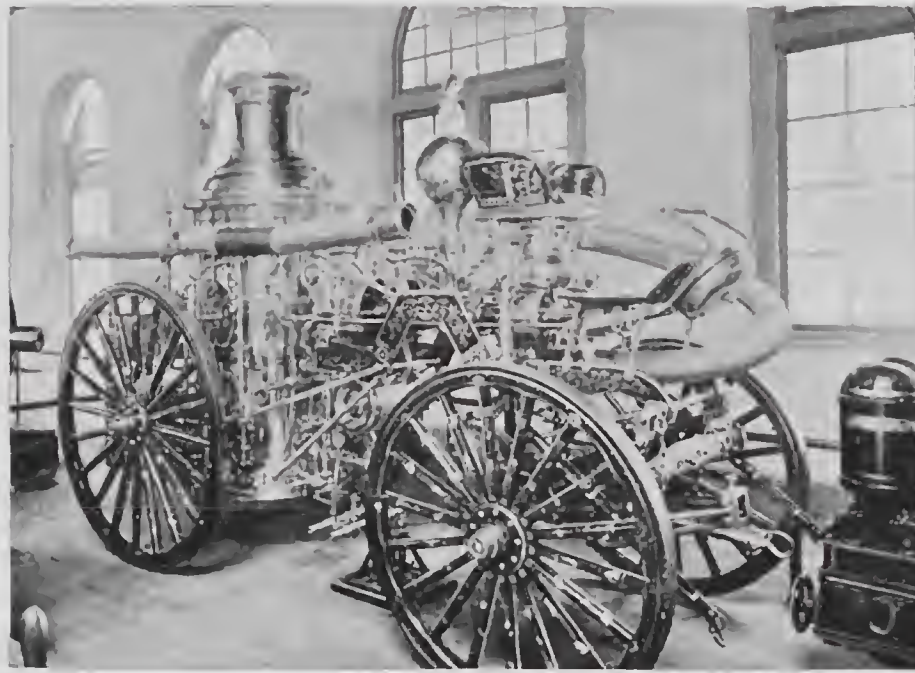
As displayed at the Fair the German machines for working in wood and metals are strongly and carefully fashioned, and well provided with safeguards; but somewhat cumbersome, lacking in finish, and in other respects inferior to those of American make. Nevertheless there are among these groups appliances well worthy of



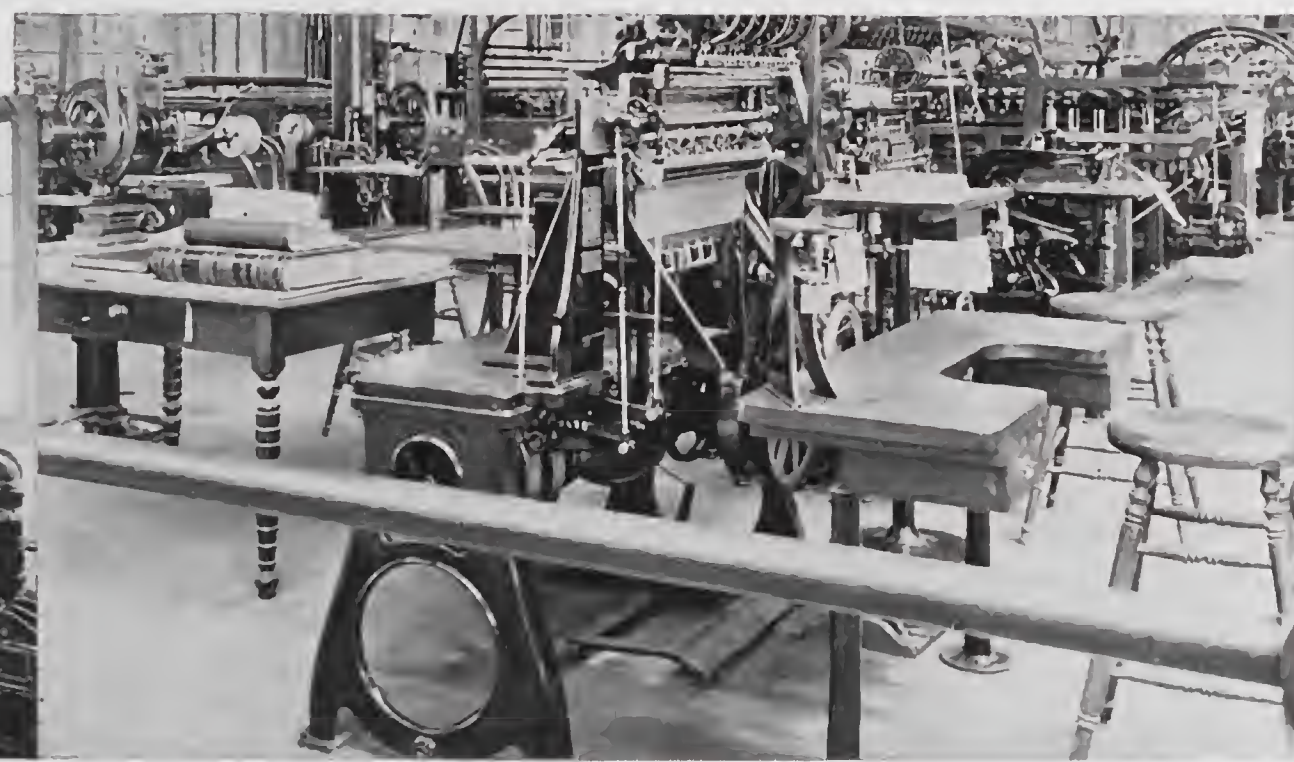
BOOKBINDERS' DOUBLE DISK RULING MACHINE

consideration. Such, for instance, is the one used for planing and molding, in which the lumber, after being placed in the machine, is stripped of its outside covering by knives with a rotary motion, and the finish imparted by stationary knives over which the lumber passes. It is then carried by rollers to other apparatus by which it is planed to the required thickness, and tongued and grooved for flooring, ceiling, wainscoting, and various uses. Another machine of similar pattern can produce 50,000 feet of flooring a day, and a third, in the form of a hand-feed planer and jointer, is one that might be used to advantage by our own mechanics.

A minor but interesting exhibit, adjoining that of the Düsseldorf firm, is a match factory, where may be observed the process of making matches, together with the boxes that contain them. A single machine, and that one worked by a single operative, can cut 12,000,000 matches a day from blocks of wood prepared for the purpose. By an ingenious contrivance more than 2,000 matches at a time can be dipped in the igniting substance, a counterfeit being used for the purpose of illustration, as inflammable materials are



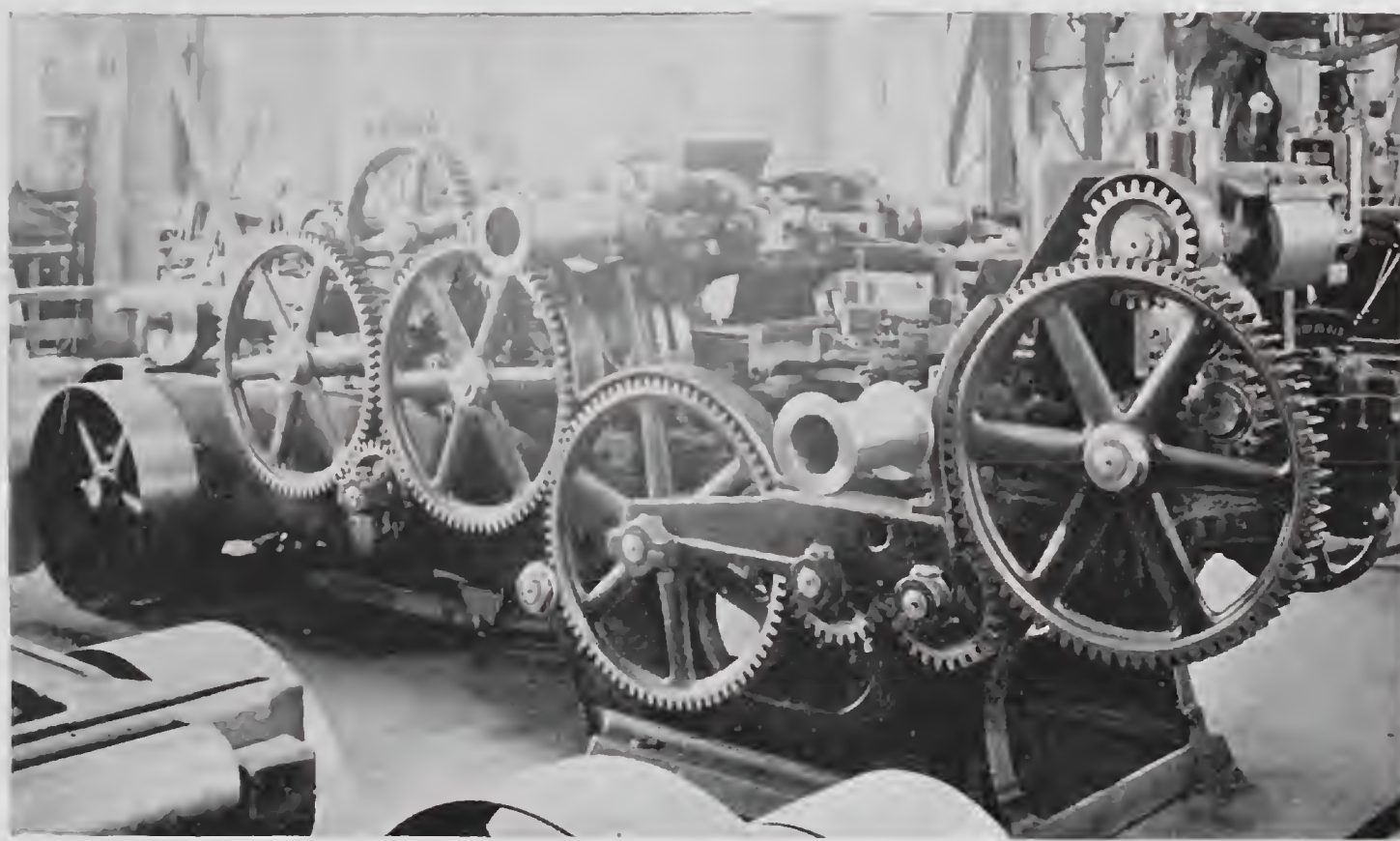
STEAM FIRE ENGINE



BOOKBINDERS' STITCHING MACHINE

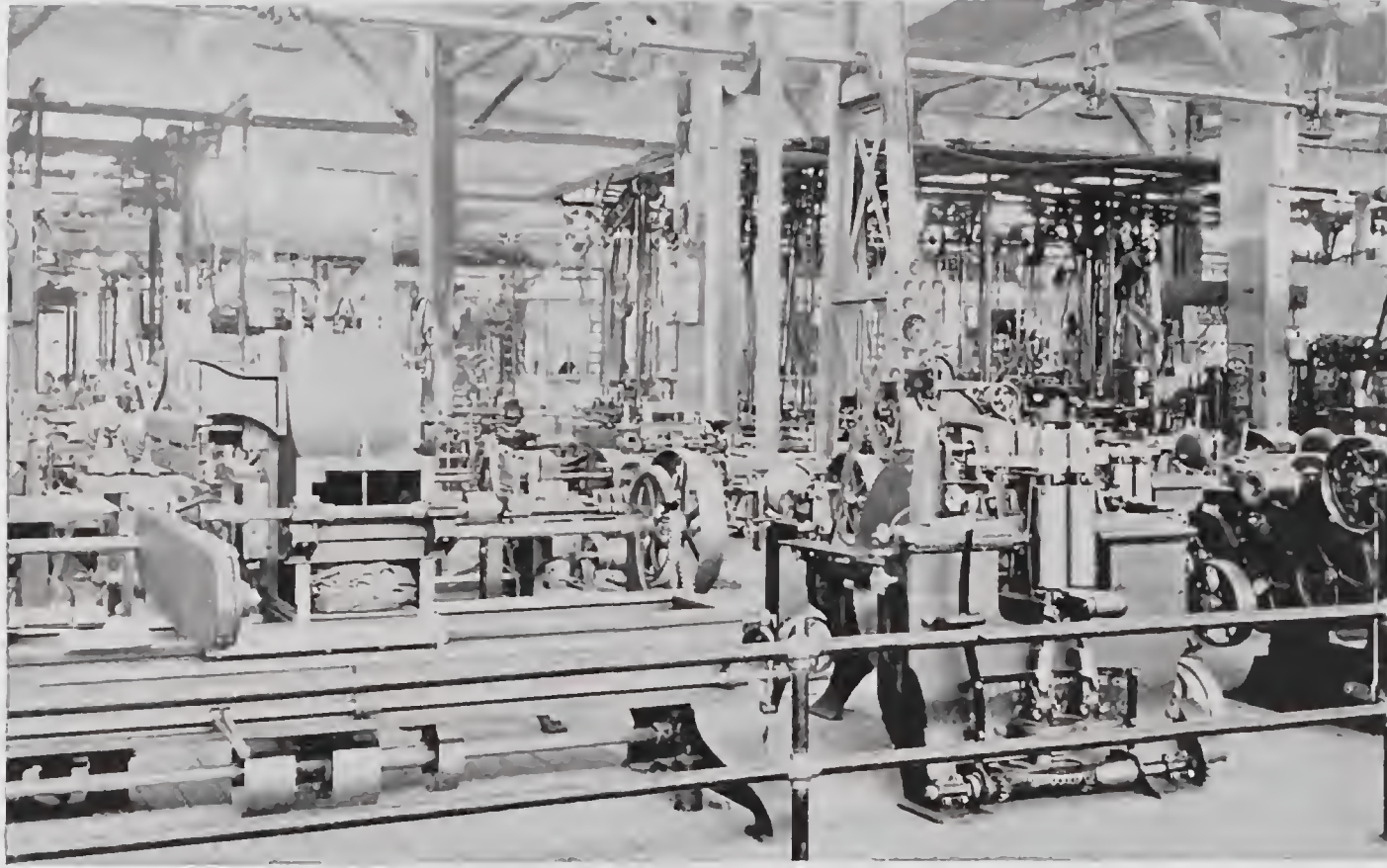
forbidden by the authorities. For preparing the boxes, there are two machines, one shaving the wood into very thin sheets, and another cutting, folding, and labelling at the rate of 30,000 or 40,000 a day.

German foundries and machine-shops are fairly represented in this section by exhibiting firms and companies



WOOD PLANING MACHINE

in addition to those already mentioned; but here it may be stated that the term machine-shop or machine-builder is not used in Germany in the American sense of the phrase, some of these establishments producing a large variety of articles. From a Magdeburg firm are specimens of its portable steam-engines, with extension tubular boilers, of which about 750 were manufactured in 1890-1, with a total of 15,500 horse-power. A Remscheid factory in Rhenish Prussia has samples of its seamless steel tubes, fashioned by a patented process in all descriptions of steel, with a large collection of miscellaneous articles, from boiler tubes to telegraph poles. A Gotha

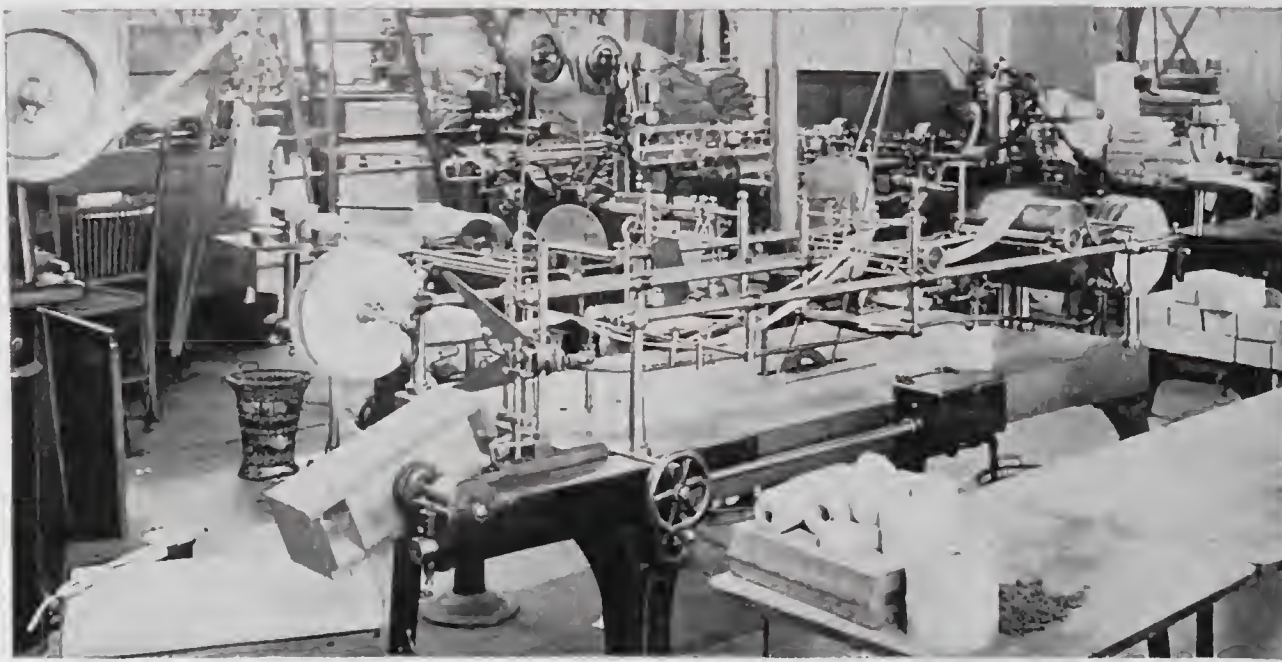


WOOD WORKING MACHINERY

of endless driving ropes for the simultaneous transmission of power in several directions. Of fire-extinguishing apparatus there is but a single illustration, furnished by the oldest of German factories in this department. In the line of textile and other fabrics, including knit goods and embroidery, there are many samples of machinery and work. A Düsseldorf firm has a collection of apparatus for decorative purposes, and a Berlin house, cutting machines for the materials used in making garments of all descriptions. An exhibitor from the little Saxony town of Aue shows how he makes 6,000,000 sheet-metal bobbins a year, such as are serviceable in many branches of textile industries. From the same town comes a large assortment of carding, napping, pressing, and other apparatus, with spinning machines for wool and web. Knitting machines are well represented, and though working less swiftly than those of American make, produce more durable goods. In this connection

may also be mentioned the display of an asbestos factory at Frankfort-on-the-Main, by which are worked up more than 1,000 tons of raw material, largely procured from its mines at Black lake in the province of Quebec.

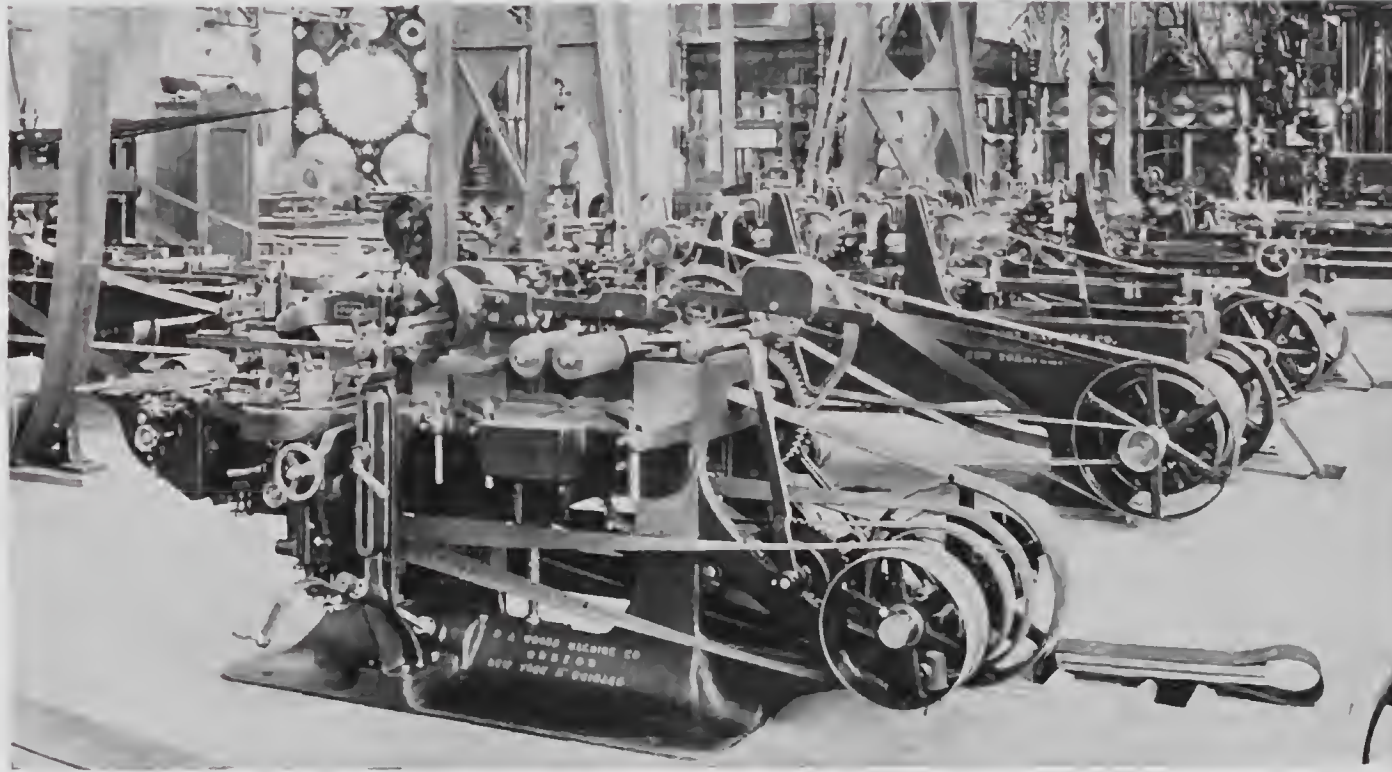
Of paper-making, paper-ruling, and book-binding machinery there are a few exhibits, and these for the most of old-fashioned apparatus, of which, however, many are furnished with modern improvements. In the entire hall there are but two paper-ruling machines of recent pattern,



BOX-MAKING MACHINERY

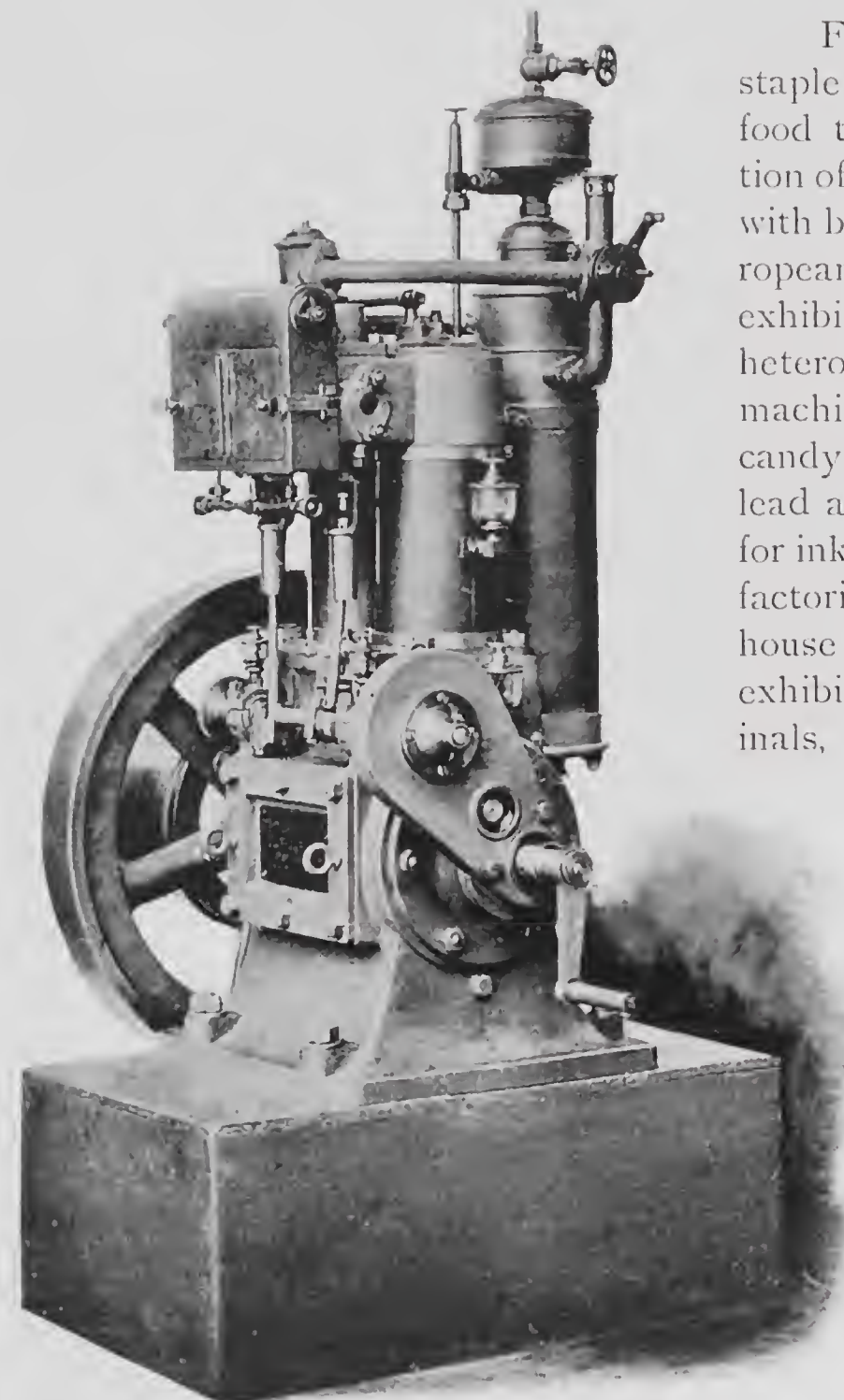
foundry displays its turbines, with a capacity of 50 horse-power, and a velocity of 170 revolutions to the minute. Another Magdeburg company has a collection of crushing and grinding machinery, with models of gas engines, and the products of chilled and malleable iron. By a Hamburg firm are shown its smoke-consuming furnaces, of which several were ordered for the new Reichstag buildings in Berlin, another exhibitor making a specialty of water-tube boilers and apparatus for superheating steam.

Of power-transmitting appliances there are several exhibits, a Hamburg manufacturer supplying the belting which runs the machines of a dozen or more exhibitors. By another firm is shown the Rouleaux method



WOOD MOULDING MACHINES

one a German, and the other an American invention, both using brass disks, fitted with metal rods, whereby the lines can be spaced to the thirtieth part of an inch. For the German machine, which is a model of simplicity and neatness, it is claimed that 4,000 sheets an hour can be ruled on both sides under the direction of a single operative. With a display of book-binding machinery a Dresden firm combines riveting and edging apparatus, and such as is used for the making of pasteboard boxes. By an Augsburg exhibitor is displayed a rotating machine for printing illustrations, and by a Heidelberg establishment a so-called lightning press, with automatic lifter and envelope feeder, by which can be printed 40,000 envelopes a day.



CYLINDER PETROLEUM ENGINE, GERMANY

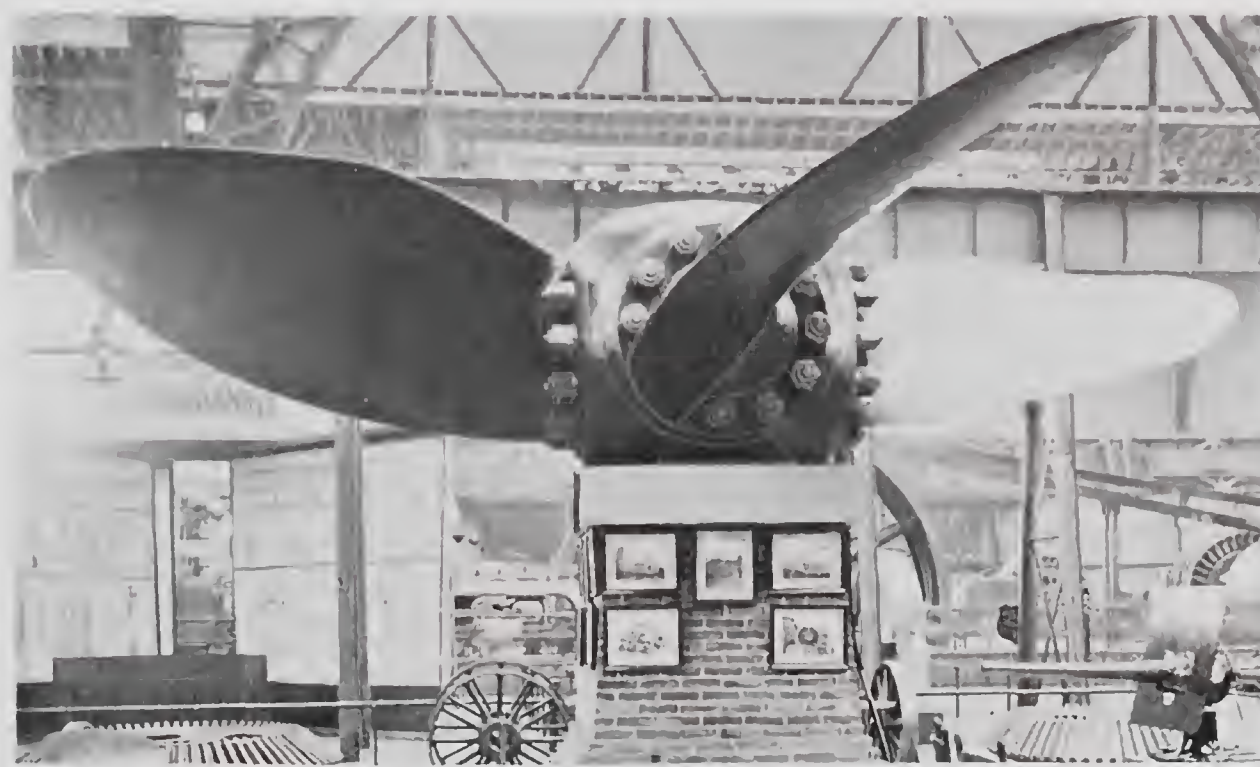
For the production of staple and other articles of food there is a large collection of apparatus from a firm with branches in several European capitals. A Dresden exhibitor has a somewhat heterogeneous assortment of machines for chocolate and candy factories, for white-lead and paint factories, and for ink, soap, and perfumery factories. A Brunswick house has an equally varied exhibit, with models, originals, or illustrations of turbines and roll-

tables, hydraulic machines, grain, oil, and other mills, and appliances for husking grain, and for giving color to rice. Still another Dresden establishment has samples of

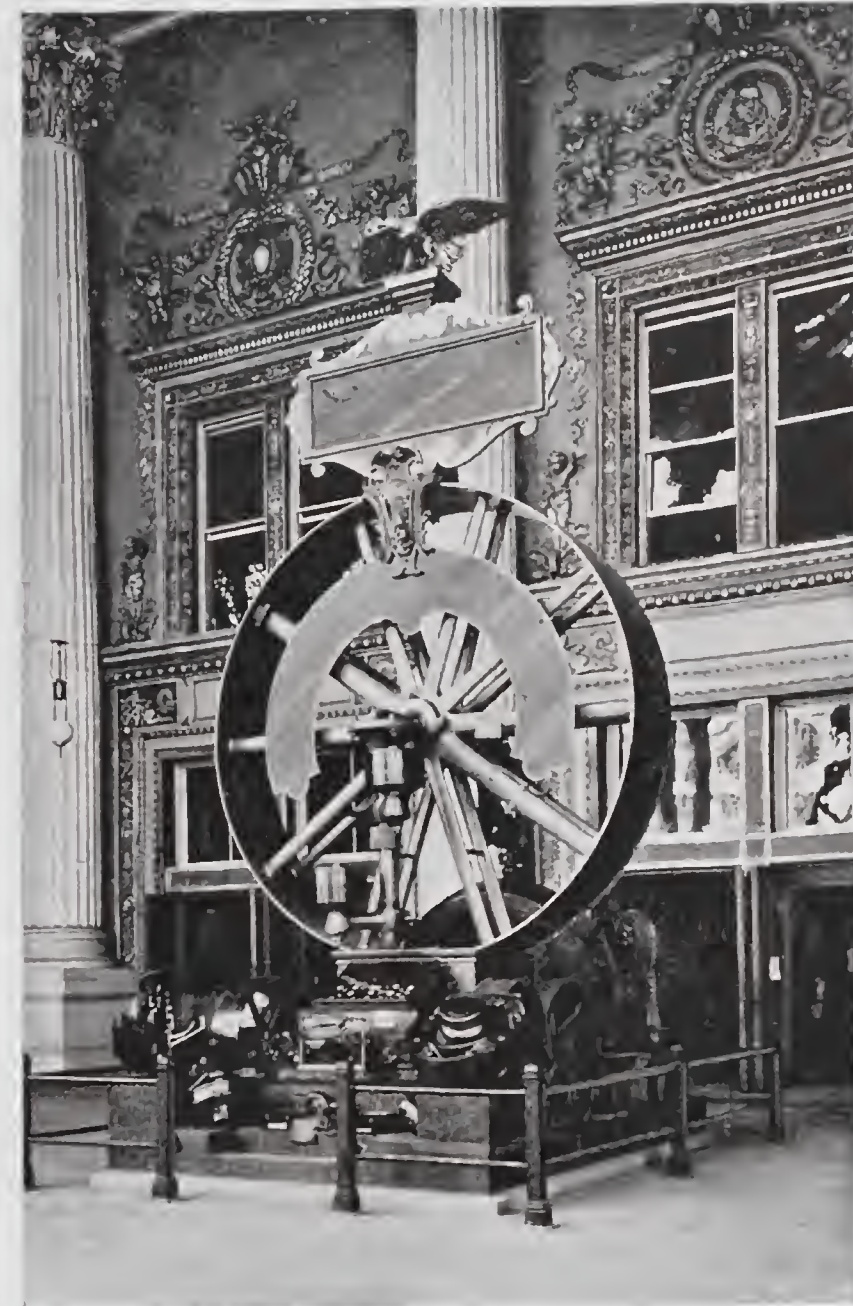
the 2,000 machines produced each year for automatic milling plants for flour-mills and warehouses. From Berlin works come specimens of their porcelains and earthenware, their gas-retorts, their

gas and steam-boiler furnaces, and their insulating materials for various purposes. A Hanover firm displays a number of patented pulley-blocks, and a Berlin house, with a branch in New York, its so-called smoke-hoods, used in the German and English navies, and its protective apparatus for firemen and others exposed to smoke and noxious vapors. Finally, there is a large collection of miscellaneous exhibits, including machinery and apparatus for cord and rope factories, for distilleries, for making shoes, for crushing rocks, for washing ores, for the manufacture of cement, and so forth till we come to meat and sausage machines, all forms of mechanism known to the Fatherland being here on exposition.

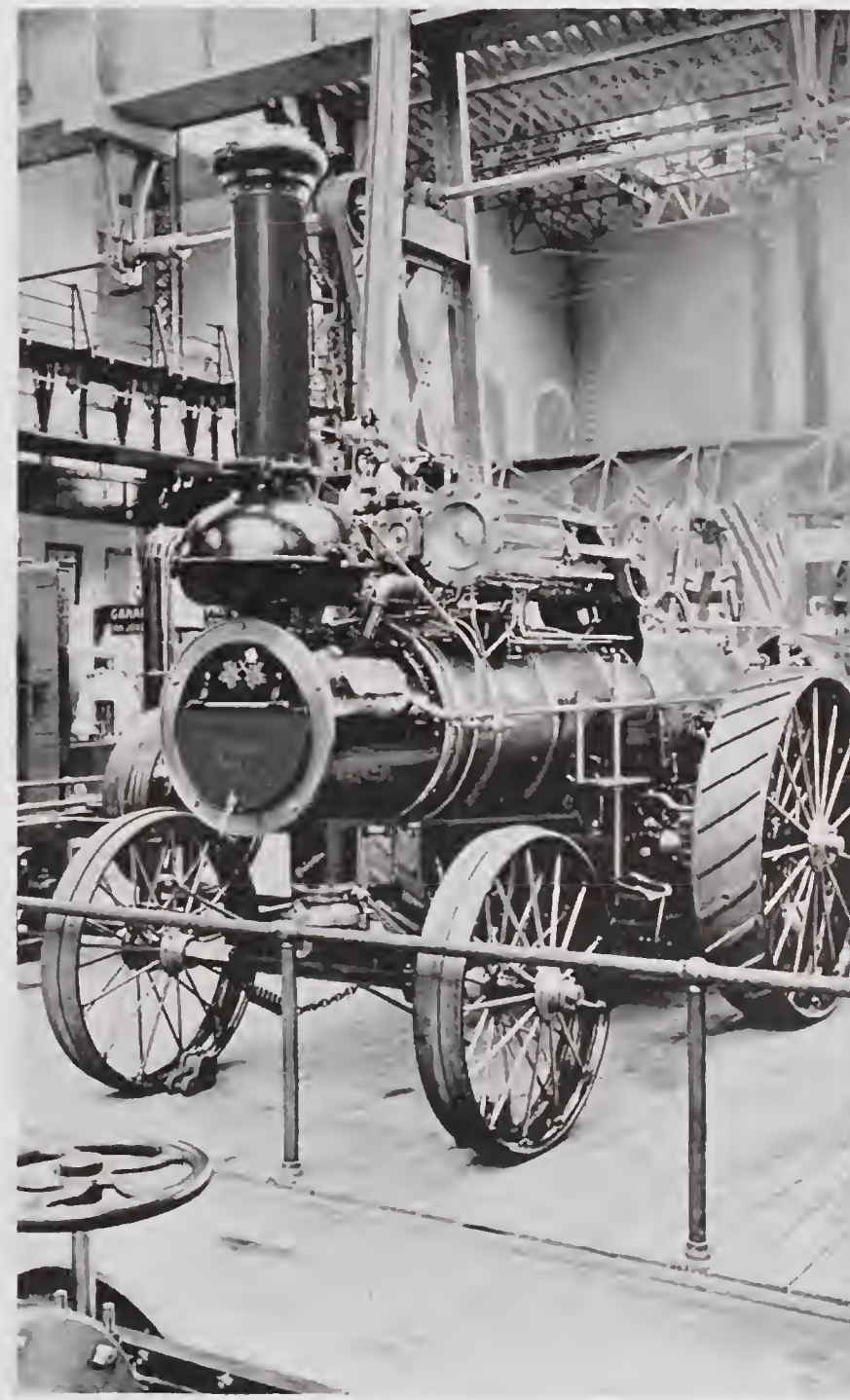
Great Britain is represented by a small but choice collection in the space assigned to her in the north-east corner of Machinery hall. Of late the tendency among British manufacturers has been



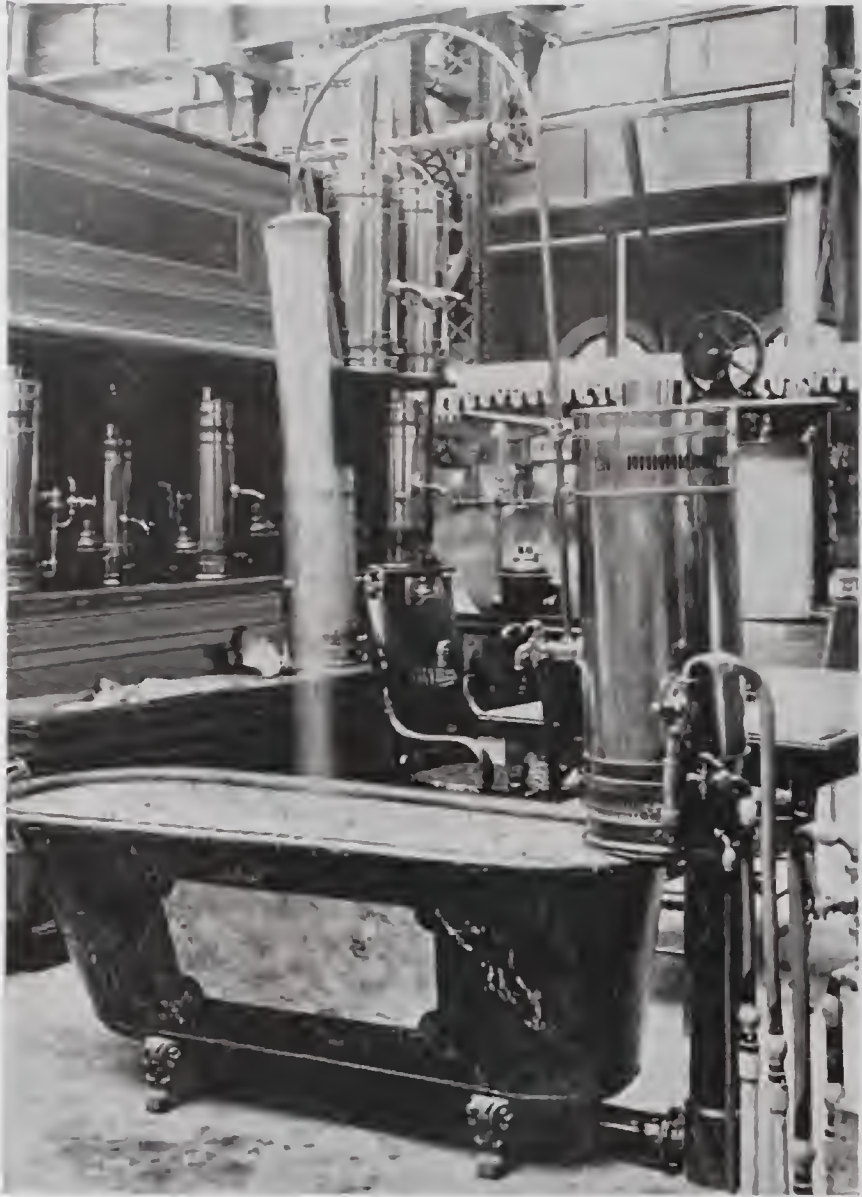
LARGE PROPELLER FOR STEAMER "SPREE"



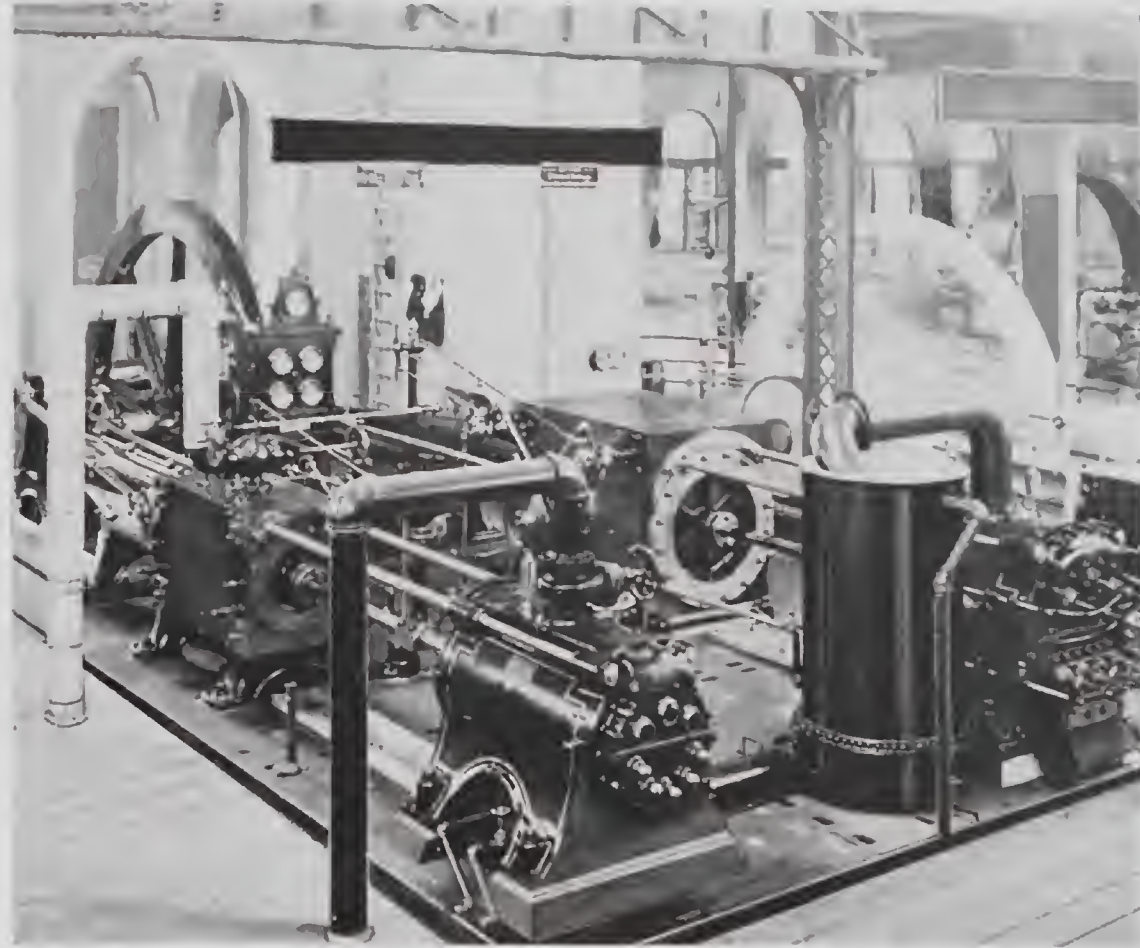
IN THE GERMAN SECTION



TRACTION ENGINE, CANADA



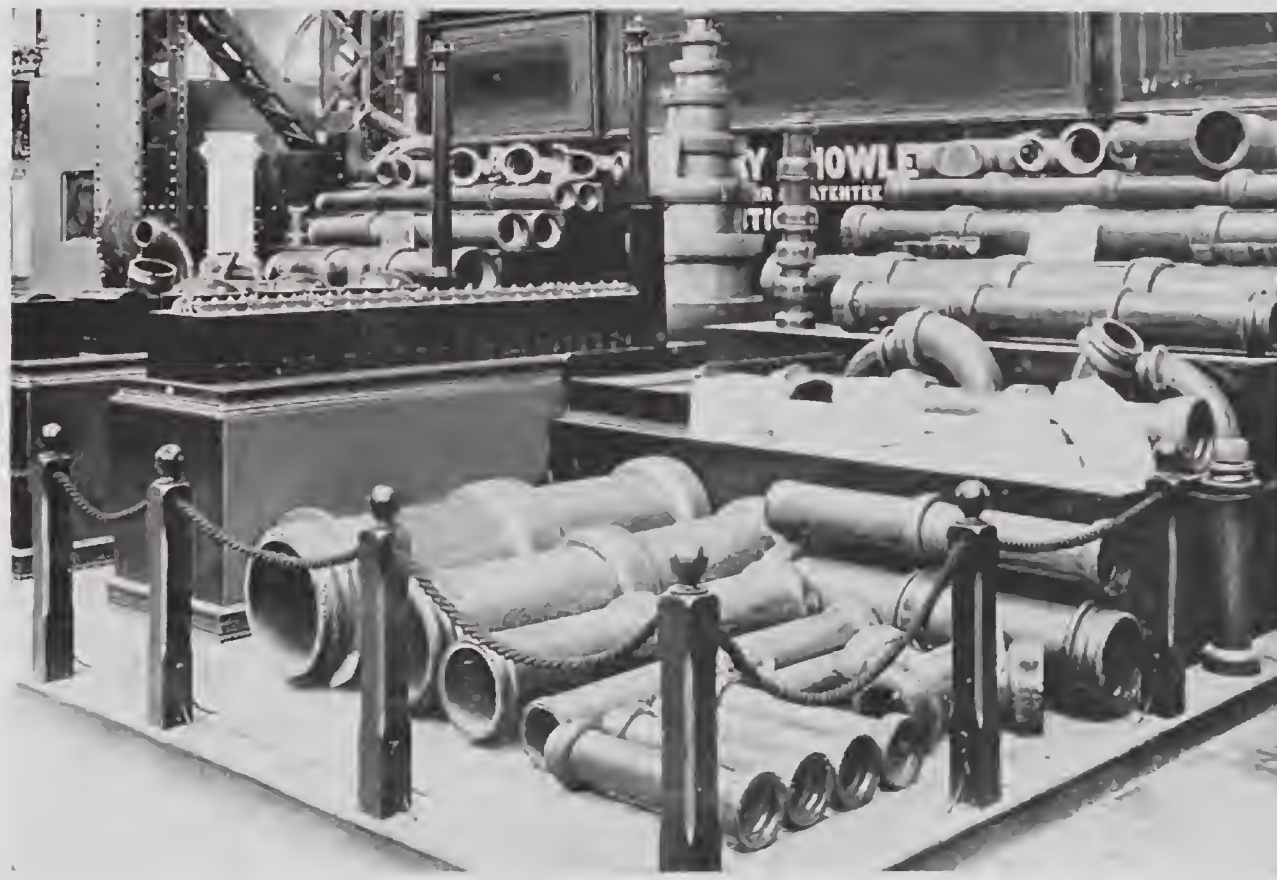
ENGLISH BATH TUB



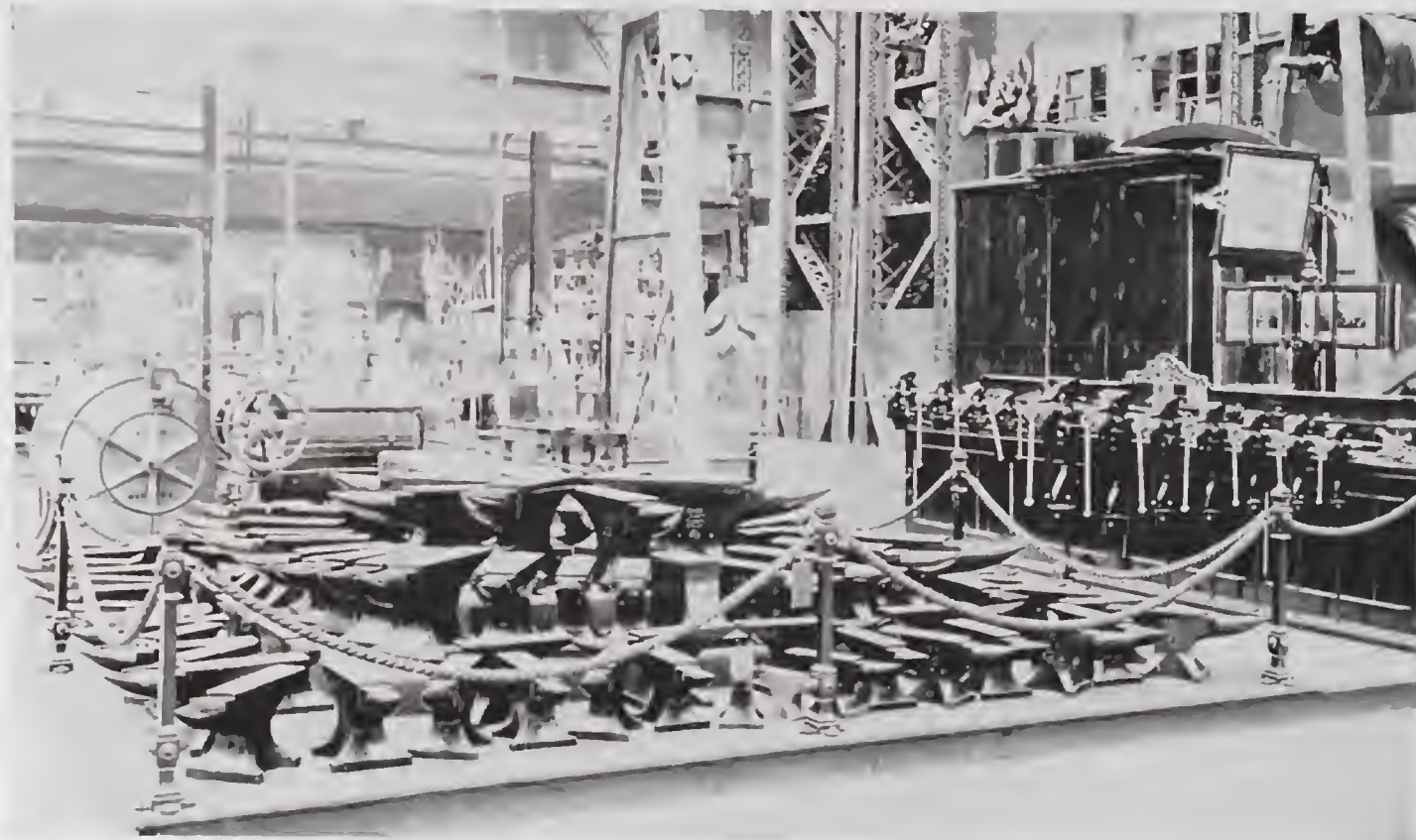
AIR COMPRESSOR

toward the construction of machines for particular lines of work, such as perform that work to the best advantage, and with the greatest economy of fuel and power. Steam engines, for instance, of all descriptions are not only modelled and proportioned for

special uses, but are supplied with apparatus for super-heating the steam before it enters the cylinders, and also for its thorough condensation, the same steam often being used in several cylinders. So with gas engines, which in some departments are rapidly superseding steam-engines. In the production of war material this specialization is about the only improvement made within recent years, machines being so constructed as to perform only a single operation, but to perform it to perfection. Such also is and long has been the drift in other branches of mechanism, and thus alone can England continue to compete with the United States, where within a year or two the production of a given article is often doubled or trebled by new labor-saving appliances.¹



ENGLISH TERRA COTTA DRAIN PIPES



ENGLISH ANVILS

¹As an instance of the decadence of British manufactures, due largely to American competition, it may be stated that the production of raw and manufactured iron has diminished considerably within recent years, while that of Bessemer steel has barely held its own. Of iron ores the imports fell from more than 4,000,000 tons in 1889 to less than 3,200,000 tons in 1891. Of blast furnaces there were on an average 445 in operation during the former year, against 373 in the latter, and from 4,651 puddling furnaces in 1883, the number decreased to 3,015 in 1890. The entire exports of British merchandise shows a small loss for the ten years ending with 1892, and a more serious loss since 1890. In the export of textile fabrics, however, there was a decided gain, textile manufactures affording employment or support to no less than 5,000,000 people, and with an invested capital of \$100,000,000.



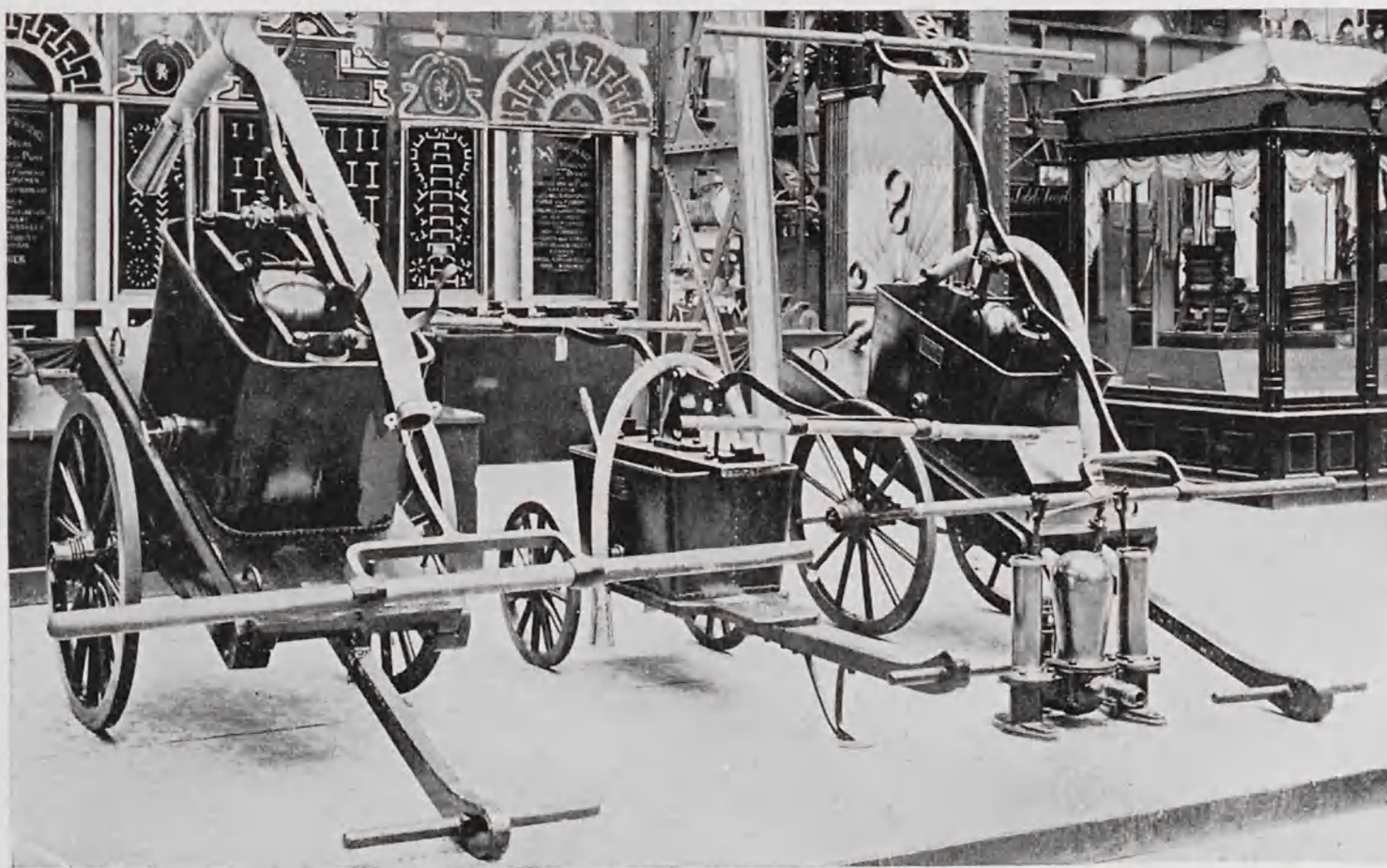
CANADA MACHINERY

First and largest among the eleven groups contained in this section is that which includes motors, and apparatus for the generation and transmission of power. Here is a horizontal compound engine of Manchester make, by which is driven one of the three lines of shafting in the British section. With 70 revolutions to the minute, a boiler pressure of 100 pounds indicates 350 horse-power. Its high-pressure cylinder is supplied with a so-called gridiron expansion valve, operated by a process recently patented, the low-pressure cylinder being placed above it, and with the axis of the former radial to the shaft centre. The governor is in the shape of a parabola, with cylindrical fly-balls, and is connected with, and controls, the rod of the expansion valve, thus admitting steam as required. The workmanship is of thorough English type, solid, substantial, and with the parts so perfectly balanced that the engine runs smoothly and quickly, is readily controlled, and with remarkable steadiness of turning.

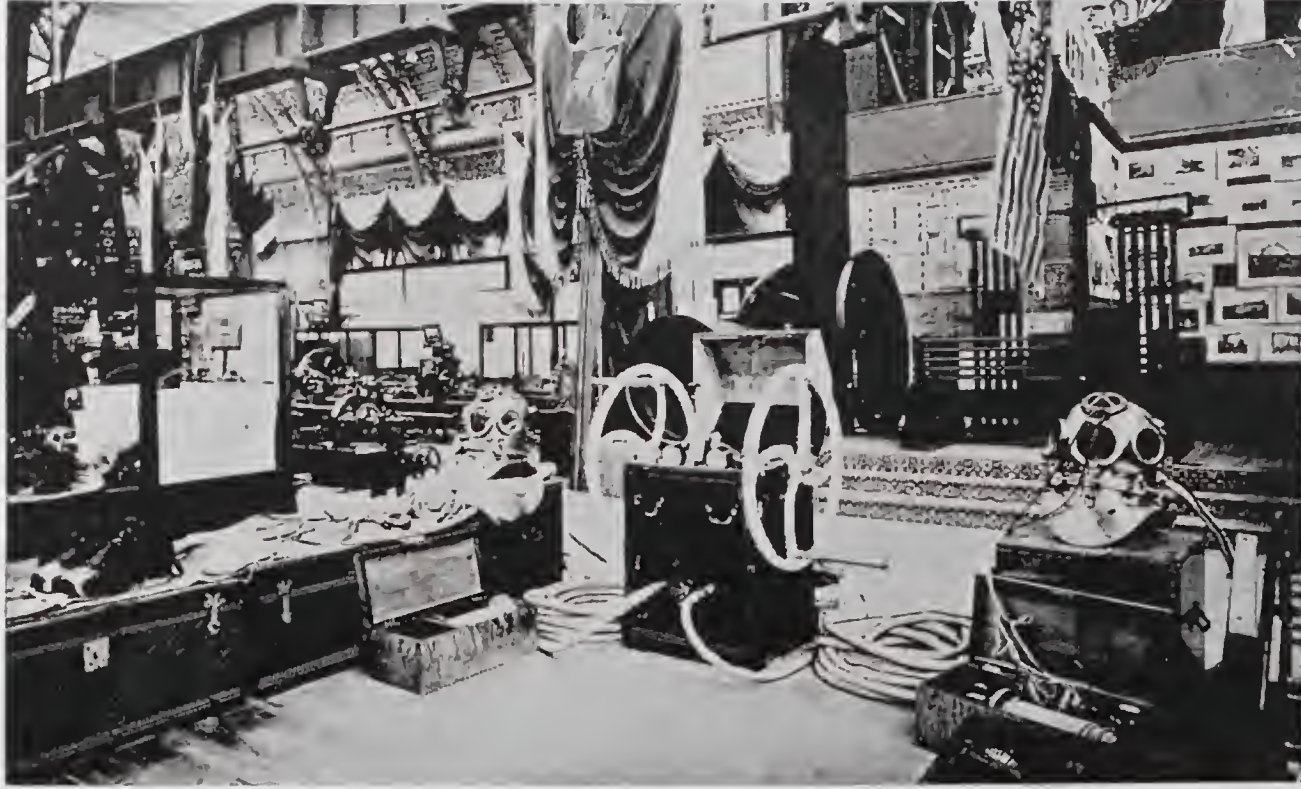
The other lines of shafting are driven by two single-acting central-valve engines, running smoothly and silently, but with remarkable speed, the normal rate



ENTRANCE TO MACHINERY HALL

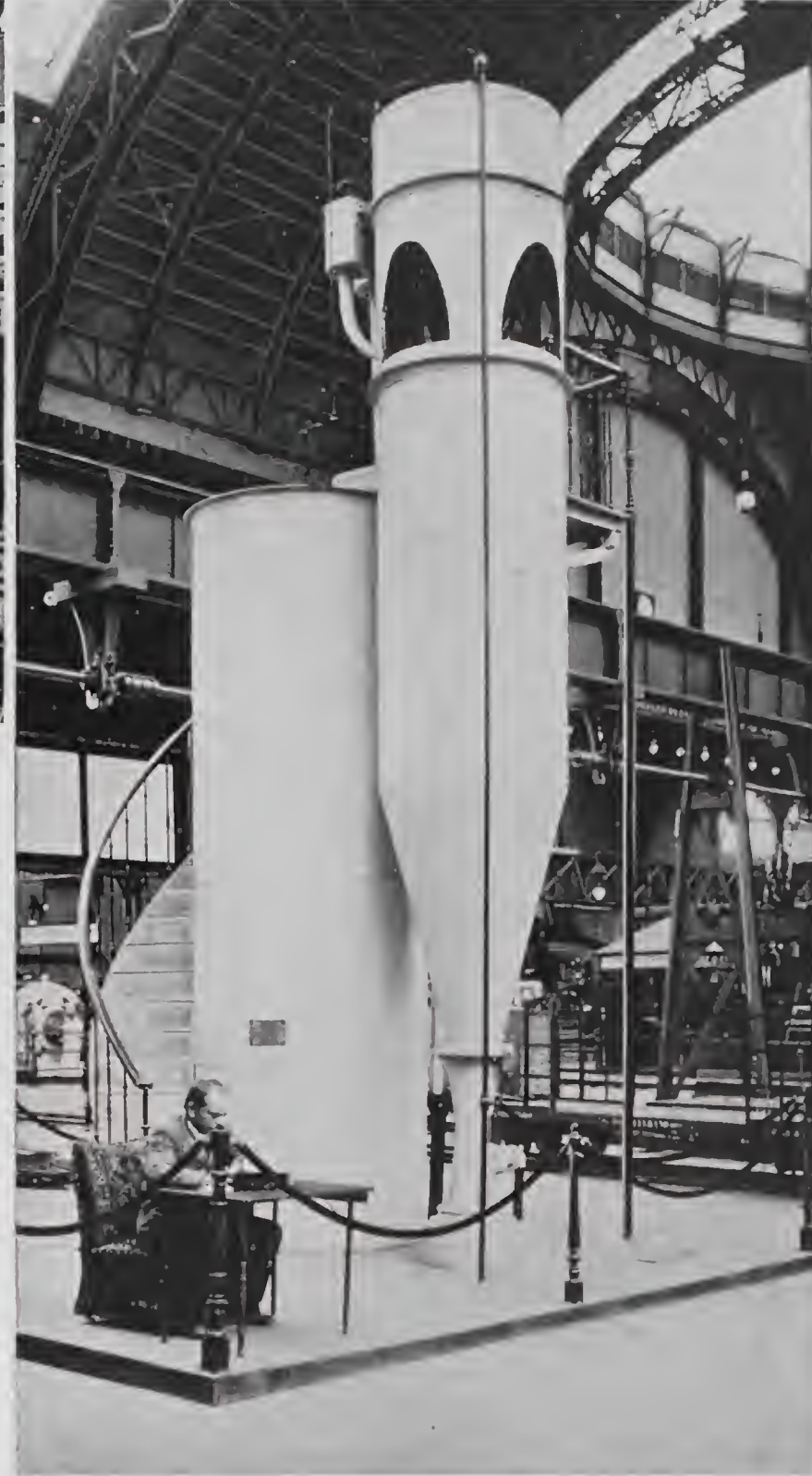


FIRE APPARATUS, BELGIUM



DIVING APPARATUS, RUSSIAN SECTION

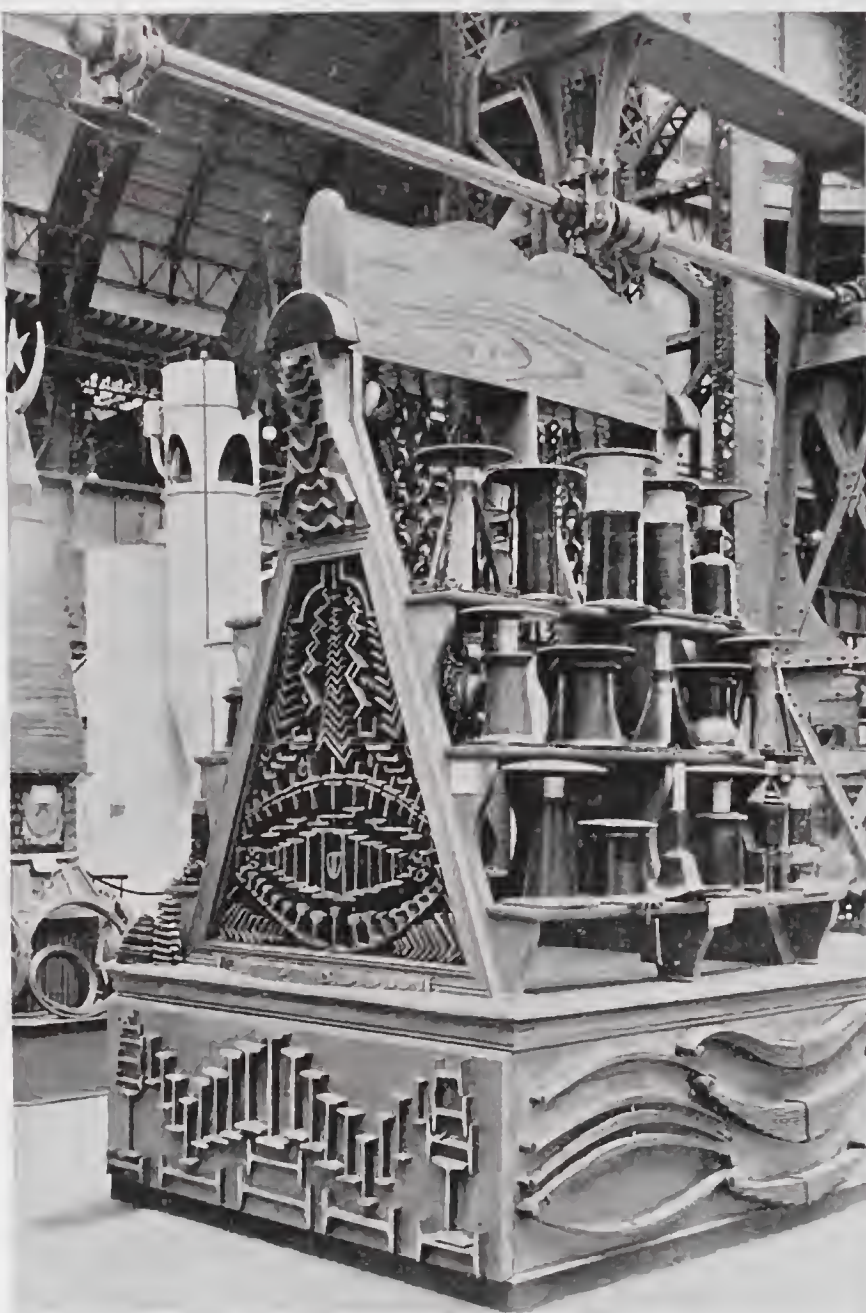
exceeding 350 revolutions to the minute. A feature in both is their small consumption of steam, which falls as low as 13 pounds an hour for each horse-power. In connection with this exhibit is a two-pole dynamo, generating electricity, through power supplied by the engine to which it is attached, at the rate of about 85 per cent of the indicated horse-power, the remainder being lost by friction. Here is a fair specimen of an English central station plant, ten of these sets forming the plant now in use at one of the largest London stations. By a Grantham firm is displayed a safety oil engine, in which the usual apparatus for firing the charge is dispensed with, the oil being converted into gas in a red-hot vaporizer. From Dumbarton works are models of quadruple expansion marine engines, now largely used by ocean and channel steamers. Among the exhibits in this group is a dual screw steam engine for propelling vessels, with concentric shafts, and without gear or belting. Worthy of note



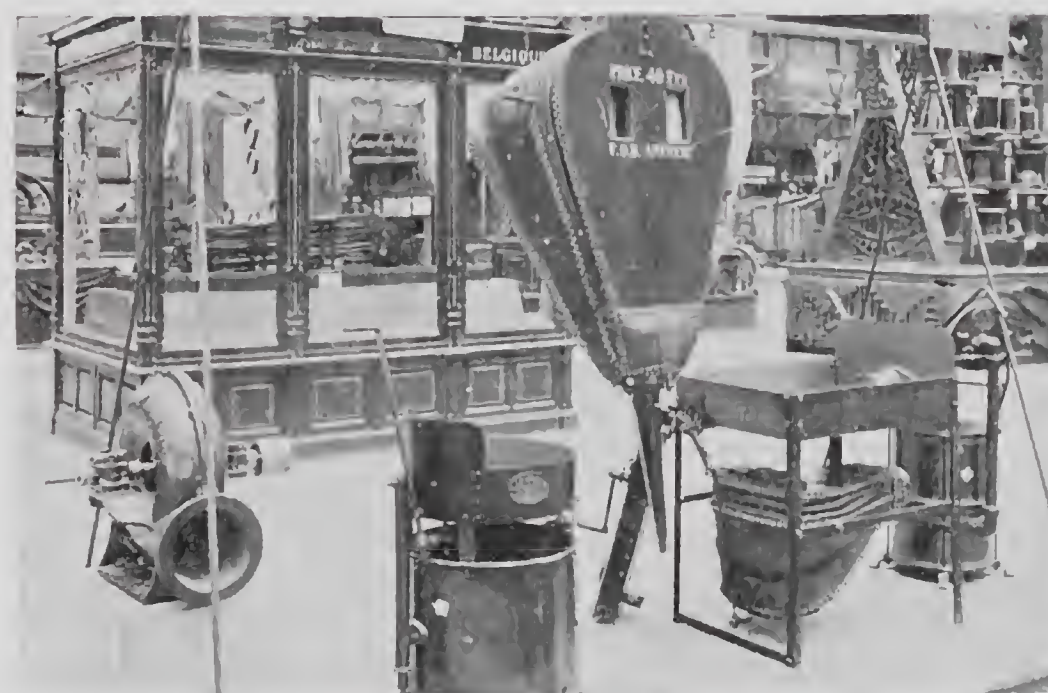
WATER PURIFIER BELGIUM

also is a large collection of beltings, including such as are made of slotted steel, leather, rubber, gutta percha, and textile fabrics, with other articles for railroad, military, and mechanical purposes.

Of apparatus for extinguishing fires there is a slender display, as also of machines for working in metal and wood, for lithographing and color printing, and for photo-mechanical and other mechanical processes of illustration, the last contained in the hall of Manufactures and Liberal Arts. Machinery for the fabrication of textiles is better represented, one firm sending a complete set of cotton cleaning, combing, and carding apparatus, and others spinning frames, and looms for cotton, wool, and silk, among the latter several of the Jacquard pattern. Of printing machines



BELGIAN RAILWAY IRON



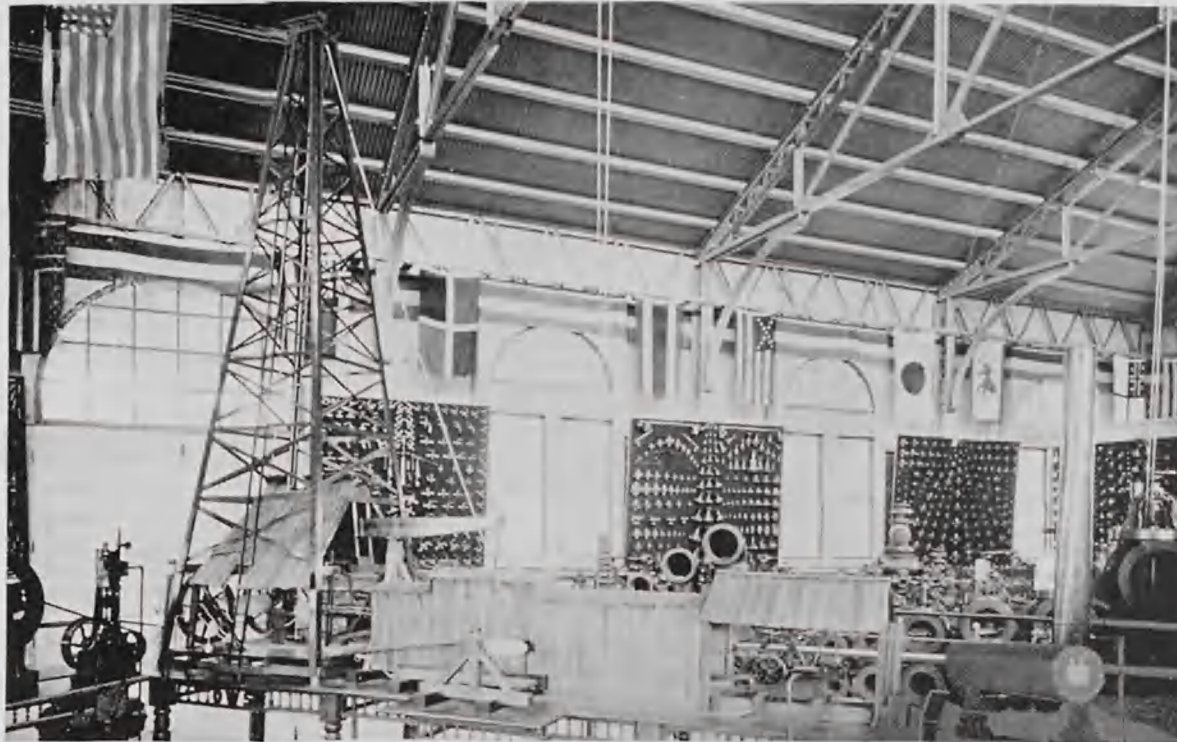
BELGIAN BELLOWS AND FORGE



BURNING OF THE COLD STORAGE BUILDING



OIL WELL DRILLING RIG



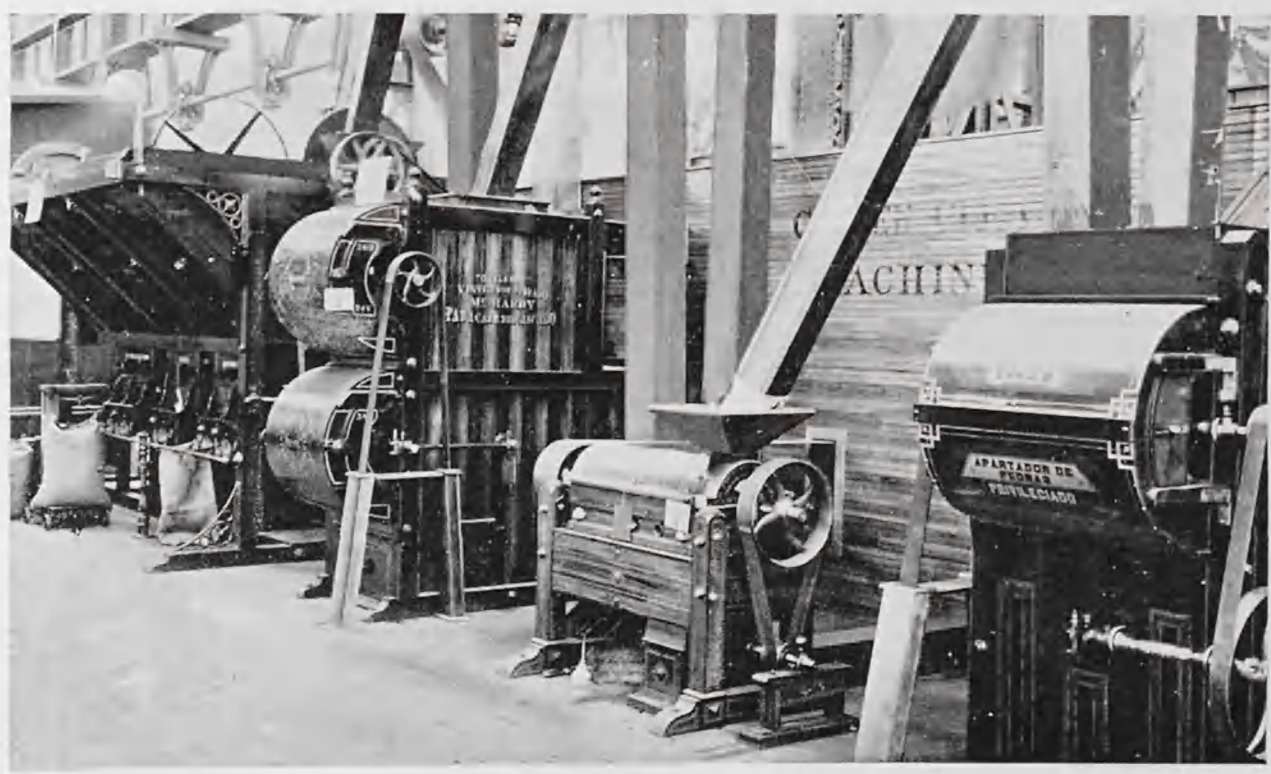
OIL BORING AND DRILLING APPARATUS

there is one which, in addition to its primary use, serves also for cutting, collecting, pasting, folding, and counting, and a London firm displays type distributing, composing, and justifying machines, with racks so arranged as to show the use of apparatus for distributing all the founts of ordinary type, from pica to pearl. A Leeds manufacturer has a machine by which bricks are made at a single operation, and a London establishment shows models of its kilns and ovens for burning bricks, tiles, pottery, and terra cotta ware, with samples of articles so burned. Of machinery for the preparation of food there are several exhibitors, one having a plant complete for bread and

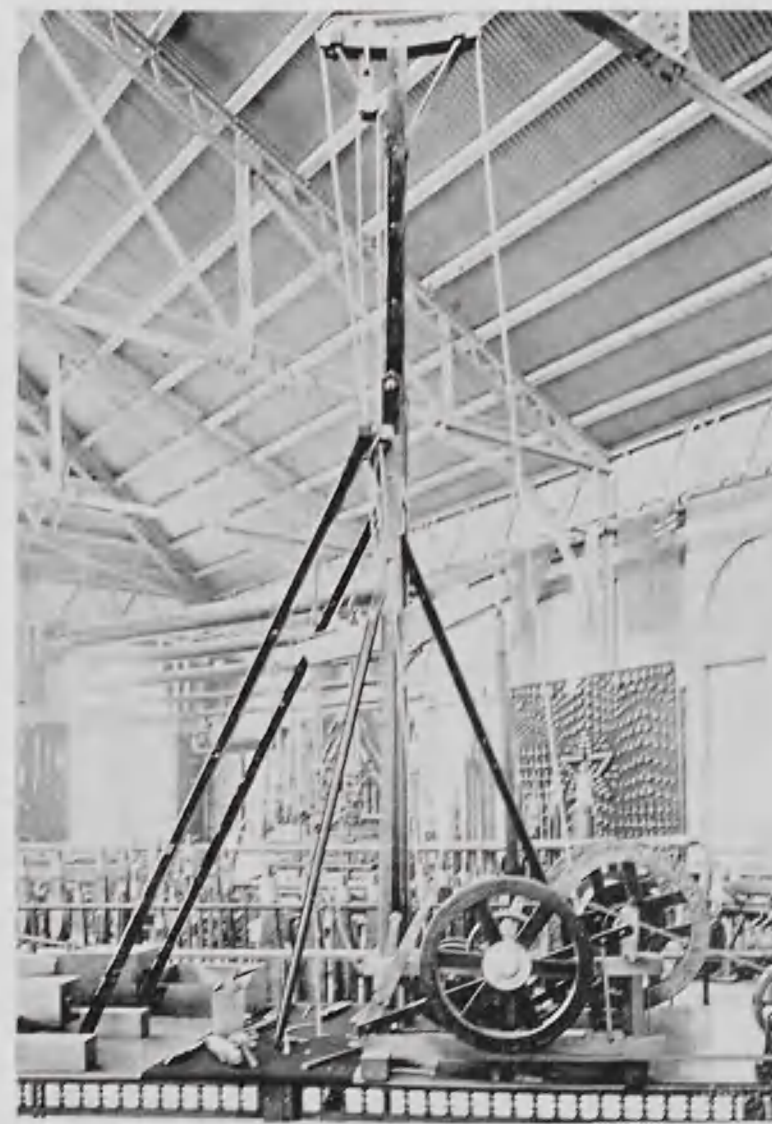
biscuit-making, for pastry, cakes, and confectionery. Finally there is in another group a so-called automatic refreshment stall, such as is used in factories and public streets for distributing light refreshments and temperance beverages.

As with most of the foreign participants, France has no very imposing display in Machinery hall, her exhibits consisting mainly of apparatus for the cutting of glass-ware, the manufacture of confectionery, soap, and candles, the grinding and polishing of lenses, and the making of delicate embroideries. In this section there is no massive machinery, the nearest approach to it being the display of mill-stones by a French quarryman, and a collection of castings and other articles from a firm of engineers and foundrymen. There are also exhibited by the Paris firm of A. Piat and company oscillating portable furnaces, and crucible cupolas, used among other purposes for gun-metal castings, statuary, and machinery bronze work, and ordinary brass castings.

Adjoining the French section, Mexico and Russia occupy small areas, the latter covering about 3,000 square feet. The Mexican exhibit is mainly one of high-speed engines, of no great size, but powerful, and well constructed. Russia has models of her enginery of war, with a collection of petroleum grates and furnaces, charts and drawings from the



COFFEE CLEANING EXHIBIT, BRAZIL



OIL MACHINERY



OIL BORING AND DRILLING MACHINE

company, and consists of specimens of merchantable iron, with plates and curved sheets, and sections of girders, sleepers, and columns. Elsewhere is machinery for making worsted goods and embroideries, ice cream and confectionery. Compared with modern American appliances, the apparatus for extinguishing fires is of somewhat primitive fashion, the fire engines of Liège reminding, one of the American hand machines of fifty years ago.

Near the eastern portico of the main hall is the Canadian section, the exhibits including a collection of small single-valve automatic engines. Here, also, is one of the very few boilers which are not in active use, a straw burning boiler, specially designed for the agriculturists of the sparsely timbered northwest territories. Wood and iron working machinery is well represented in this section, as are also such domestic appliances as washing machines, patent clothes lines, and meat choppers. There are several brick-making machines on exhibition, and the fire engine displayed by the Ontario works will bear comparison with those in the American department.

Southwest of the German section are the small exhibits of New South Wales and Sweden, the chief interest in the former centring in a case of electrotypes presented by the government printing office as samples of its work. A Swedish doctor of philosophy from Stockholm contributes a few dynamos, and an inventor of the same city shows a machine whereby can be made nearly 200 barrels an hour. Adjoining the Swedish section are a few small Spanish machines, including those for raising water, and for

government institute of technology, and illustrations of the course of instruction pursued in the school for sub-marine divers, at Cronstadt. Methods of lighting by electric lamps, and of regulating the breathing of the divers are shown by photographs, and on a table near by is a huge diver's suit of orthodox pattern.

Austria occupies more than 8,000 square feet between the French and Belgian sections. In one of the booths is delicate glassware, much of it adorned with outlines of the Exposition buildings; in another, handkerchiefs, embroideries, and various fabrics. Among machines and appliances are those for making bon-bons, for lithographic work, and protective purposes, and for operating circular saws, while a Pilsen factory displays some specimens of ordnance, a large screw for a steamer, and photographs of armor which has been penetrated by missiles manufactured at its works.

The Brazilian booth, adjacent to the Austrian section, contains an exhibit of coffee cleaning apparatus, contributed by several San Paulo and Campia firms. One machine separates the coffee from the stones with which it may be mixed, the ventilator clearing away the leaves, earth, and other refuse; another hulls the coffee without breaking the kernels or allowing any to escape, reducing the shell almost to powder, which is removed by a connecting ventilator; a third segregates all the black and inferior grains, and allows the coffee to fall into a series of sieves, thus separating it into its several commercial grades.

A considerable area in the eastern portion of the main hall, between the power plant and the British section, is covered by the exhibits from Belgium. The most extensive display is from the works of a large iron and steel



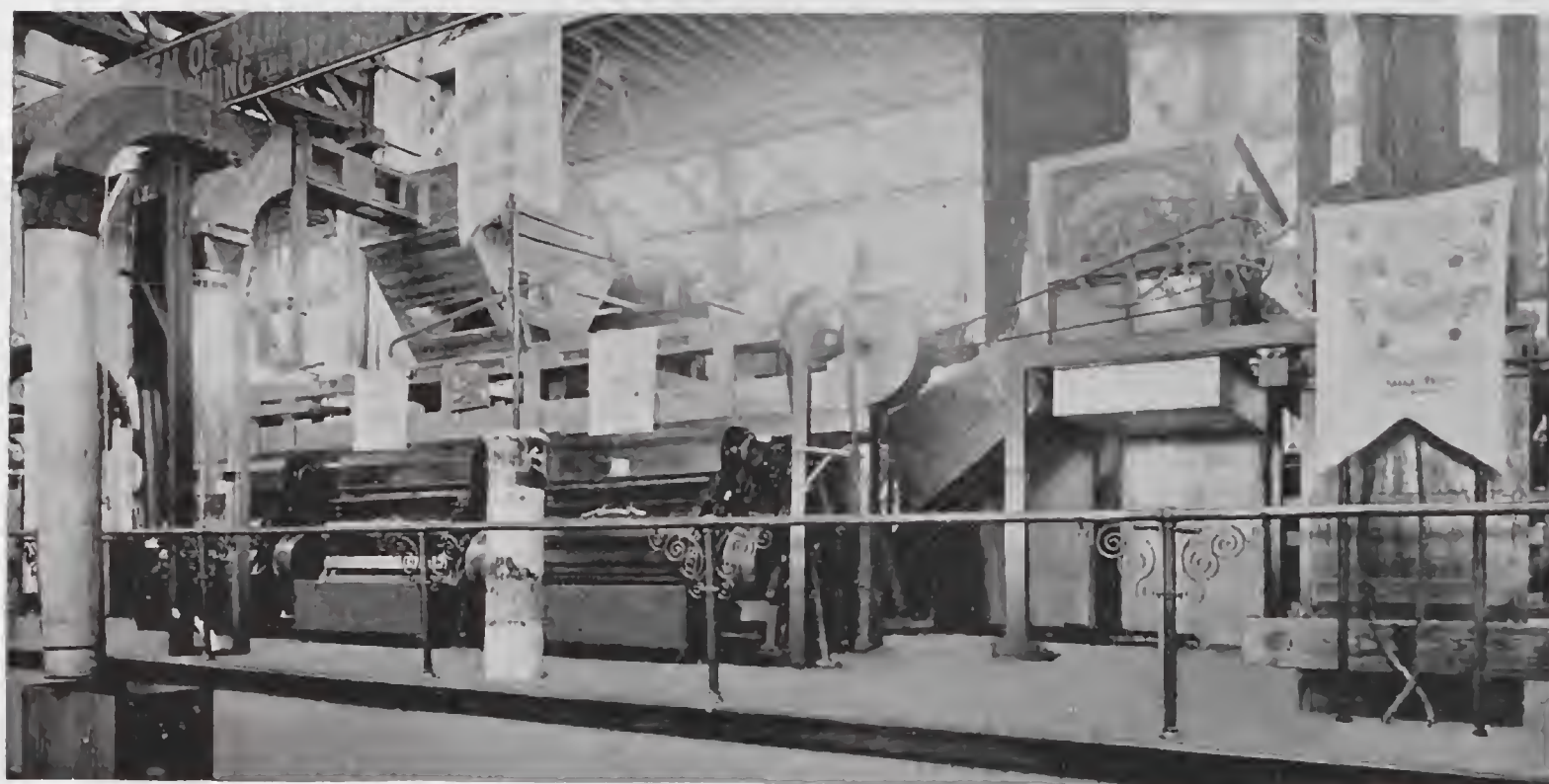
BRITISH SECTION



SHALLOW OIL WELL APPARATUS

planing. In this vicinity also Switzerland and Italy have minor exhibits, the chief feature in that of the former being a practical illustration of processes of electro-plating with gold and silver. Lenses, embroidery machines, and oil manufactures are displayed in the Italian group.

WORLD'S FAIR MISCELLANY.—Almost while in the act of penning my description of the Cold Storage building and its contents, came their destruction by fire on the evening of the 10th of July, 1893. This edifice was erected by the Hercules Iron company of Aurora, Illinois, and the exhibits, together with the systems which they illustrated, were those of the West Side Artificial Ice company, of Chicago. From the centre of the structure rose to a height of 220 feet a wooden tower, covered with staff, and surmounted by a dome. Here it was, near the base of the dome, that the fire was first discovered. The engines were quickly on hand, and from a narrow



COTTON MACHINERY

ledge, a few feet below, the men stood, hose in hand, prepared for action. But at this juncture tongues of fire shot forth near the base of the tower, and a moment later the flames broke out with a smothered roar from every portion of the tower, cutting off the retreat of the firemen. Then followed a scene of horror such as few have ever witnessed. Around this narrow ledge the firemen ran, vainly seeking an avenue of escape. One slid downward on a rope; another on a line of hose; but hose and rope snapped, and the men disappeared in flame and smoke. Some fell, and some threw themselves headlong on the roof, more than eighty feet below; and as the tower parted in the middle, and fell crashing into the burning gulf, the one human being who remained on the ledge was seen to leap into air, and then fall prone into the devouring sea.

During the investigation of the coroner's jury it was shown that the steel smoke-stack enclosed within the tower was fourteen inches shorter than the structure itself. In the plans, as prepared by the architect, this space was to be occupied by a thimble for the protection of the exposed wood-work; but in the construction of the building this safeguard was omitted, and hence the disaster, with its attendant holocaust, in which seventeen lives were lost. Of the gate receipts of the following Sunday \$25,000 was set apart by the management as the nucleus of a relief fund, and this was swelled by further contributions to nearly \$100,000.

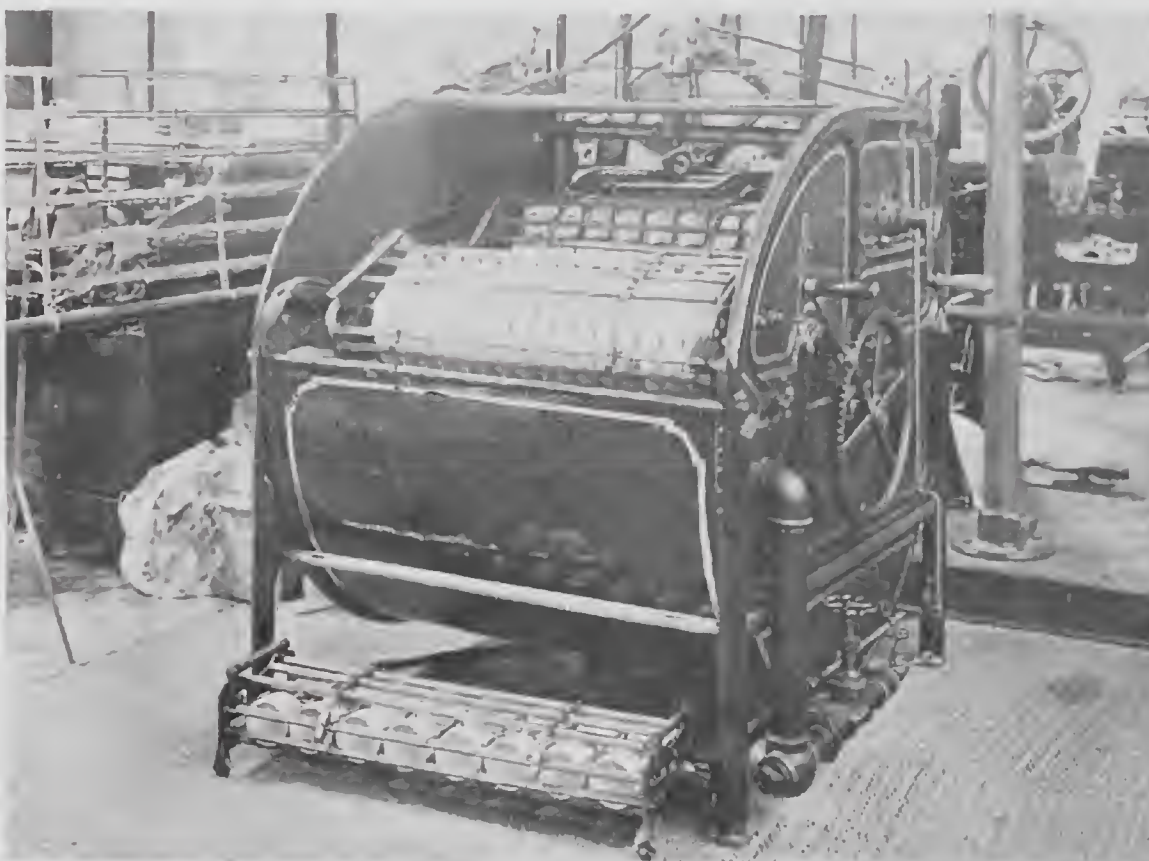
To the Westinghouse Electric and Manufacturing company was awarded the contract for providing the plant by which the buildings and grounds of the Exposition are supplied with incandescent lights, and for this purpose it placed in Machinery hall fourteen machines, with an aggregate capacity of 158,000 sixteen-candle power lamps. In the construction of its system were used some forty-five miles of wire, while the Exposition authorities ordered 250 miles of wire, covered with rubber, or lead, for the completion of the arc circuits. There are also about forty miles of conductors.

Covering a large area directly south of Machinery hall are exhibits connected with the oil industries of the country. Great

derrick, drilling machines, and tanks are as profusely displayed as in the oil regions of Pennsylvania and Ohio. The centre of these exhibits is a stone building, erected by the Oil Well Supply company, of Pittsburg, outside of which are all the apparatus required for boring and drilling. Within the building, which is decorated with the flags of all nations, are models of machines showing the development of various processes of obtaining oil, with a large collection of pumps in operation, and of fittings and tools used in boring for petroleum and gas. Portable drills for surface wells, and the large machines designed for boring to a depth of about 3,000 feet are shown both as models and originals. In the centre of the building are photographic and other illustrations contrasting the present apparatus of the company with such as was used by its founder thirty years ago.

About 100 feet south-east of the main hall, and a short distance from Michigan's logging camp, is a model saw-mill erected for the purpose of exhibiting, in operation, the most improved machines for transforming lumber into its manufactures, and for keeping machinery in repair. The north-west supplies white pine, the south yellow pine, the west cedar and cottonwood, and other sections many varieties of hard-wood, all of which are made into such articles as shingles, barrels, and boards. About a dozen companies by which are made the larger machines for working wood, place specimens of their work in the model mill. There are portable saw-mills, jig and circular saws, log rollers, and all kinds of machines for sharpening and setting saws, with a collection of filing machinery.

As previously noted, the exhibit of road-making machines although included in this department was considerably scattered, some of the rollers being placed in the Transportation building, and



COLUMBIA DISH WASHER

others in the Mining and Agricultural buildings, and the model saw-mill. At times a collective exhibit of these machines in actual operation may be seen near the shore of the south pond, and the Intramural railroad.

The largest boiler in the plant is in the boiler-house extension, and is named the Morrin's Climax. It generates steam equal to 1,500

horse-power, and has a heating surface of 10,000 square feet. The boilers are connected with the oil storage tanks by steam coils, in which the oil may be heated in cold weather. Exhibitors may select for themselves the burner to be used for their apparatus. In some cases the burners and connections are kept behind fire-proof doors, the supply of air passing from the rear to the front of the furnace, where it comes in contact with a spray of oil, and is heated to a high temperature before combustion takes place.

By the Allis engine in Machinery hall was virtually put in motion the entire mechanism of the Exposition. When President Cleveland pressed the electric button, and closed the circuit, an electric valve attached to a four-inch pipe was opened, steam being thus admitted to the engine which, in turn, brought its two great dynamos into play. Near this engine is one of 1,000 horse-power, and with a fly-wheel 28 feet in diameter, belted to a dynamo. All exhibitors furnished with power to operate engines or machinery from the regular plant, paid the department at the rate of \$60 per horse-power for the season, if their machines were run continuously. The amount of power furnished gratuitously was only sufficient to keep a machine long enough in motion to show its workings.

Except by specialists, it is not generally known that wood, granite, cast-iron, and copper, were formerly used in the construction of boilers, the last as recently as thirty years ago. When inventors were called upon to meet the demand of manufacturers for something that would withstand a higher pressure, they were obliged to substitute plate iron and steel, and as we have seen in speaking of the boiler plant of Machinery hall, to distribute the aggregate power generated among numerous tubes, or miniature boilers.

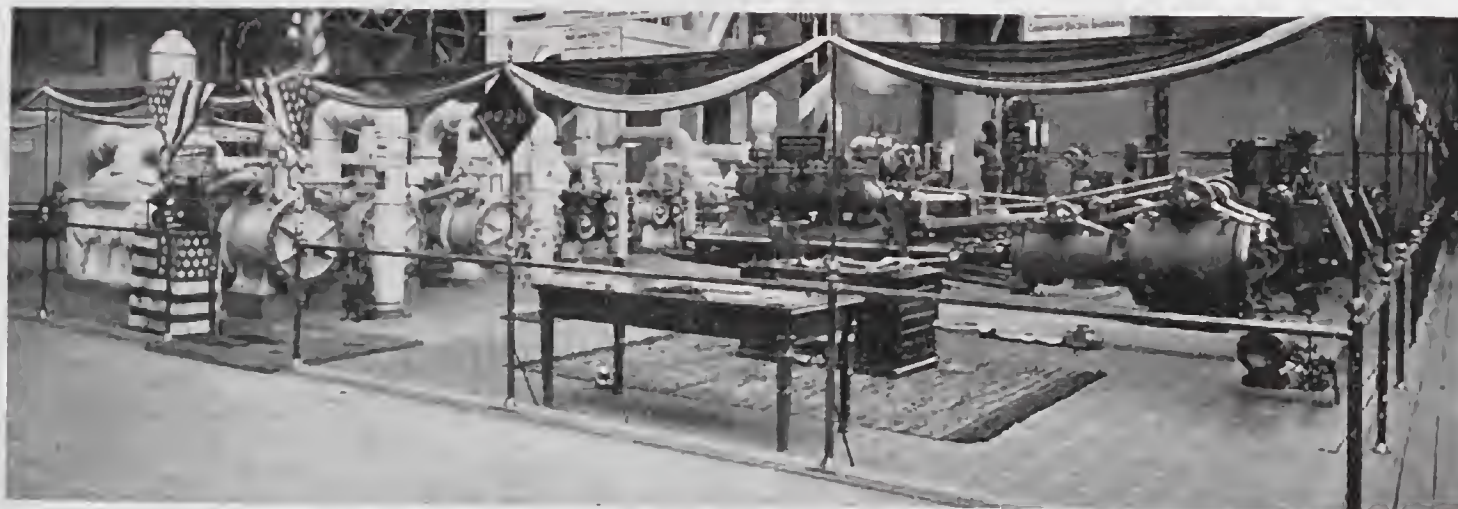
While no great progress has been made within recent years toward increasing the efficiency of steam boilers, there has been a large reduction in the quantity of steam consumed by engines in proportion to their horse-power, amounting probably to 30 per cent within the last score of years. This has been mainly caused by the more general introduction of the compound system, one by no means new, but which, for whatever reason, engineers were slow to adopt. It is to be regretted that no provision has been made in Machinery hall for a comparative test of boilers and engines, for which an excellent opportunity is here afforded.

In the eastern gallery is a black walnut case from which protrude ten levers, and from these pulleys connect with the bells in the tower above, whence their chimes are heard at intervals afar in the grounds. The bells are fastened to a massive oak frame, the heaviest weighing 3,000 pounds, and the lightest, 300. It is stated that the same company which manufactured the first large chime of bells in the United States, more than fifty years ago, furnished the one in Machinery hall.

Among the miscellaneous exhibits is that of the so-called Working-Men's Insurance in the form of a series of tables, or charts. This is from the Imperial Insurance department of the German empire, and intended to bring to the attention of Americans its system of compulsory insurance. Its three funds, providing against accident, sickness, and old age, are contributed from state employers and employes, the payments of each being determined by the aggregate of wages disbursed, and of individual wages received.

Another minor exhibit in the German section is a cigar-rolling machine that makes cigars of every shape, and of which there are many thousands in use. Still another consists of dough-making machines, of a pattern for which it is claimed that more than thirty exposition medals have been received. A special class includes a large assortment of miscellaneous machinery and processes, including such as are used for the reproduction of oil paintings, for polishing plate-glass, for shelling grain, and for making syrup out of potatoes. The only mural painting in the German pavilion is on the northern wall above the portal, and represents a longitudinal section of an armored turret for coast defense, constructed by Friedrich Krupp.

Saturday, the 26th of August, was known as Machinery hall day, when was given the first of a series of entertainments in connection with the main departments of the Fair. At nine o'clock, when the great chime of bells rang forth from the tower, the building was already filled, and soon afterward was densely crowded, thousands passing in and out in one unbroken stream. At noon were songs by jubilee singers, and an hour later, diving exhibitions in the lagoon which flanks the Machinery building. First was illustrated the system of telephoning under water, as adopted by the Russian naval school at Cronstadt, the diver, one Assenig Korotacffsky, encasing himself in a diving suit, weighted with lead, and, as he sank and emerged from the water, suggesting that a new species of sea-serpent had been added to the World's Fair exhibits. Then came a pitched battle between crews selected from the boiler and engine-rooms, attired in bathing suits, and placed on board scows forty feet apart. Both were



WORTHINGTON PUMP EXHIBIT

supplied with hoses to which a pressure of eighty pounds was furnished by Worthington pumps, and at a given signal the fight began, victory declaring for the crew that should knock its opponents overboard into the lagoon. The captain of one of the boats weighed about 300 pounds, and as he stood grasping his hose, arrayed in a close-fitting suit with alternate stripes of black and red, his appearance was greeted with roars of merriment. After a brief but spirited contest, his men were worsted, and their scow began to sink, the fat man betaking himself and his 300 pounds to shore as best he could. This was followed by an aquatic contest between two companies of so-called royal horse marines, with brooms as weapons, and steeds in the shape of barrels, sufficiently weighted, and with imitation heads and tails. After this was a greased pole performance, several competitors for the prizes which hung at its end, suspended over the pond, receiving instead a fresh water bath, among them the fat man, who after a futile attempt plunged like a porpoise into the lagoon. Other diversions followed, accompanied with music, and special exhibits of machinery in motion.



CHAPTER THE THIRTEENTH

AGRICULTURE



THE Agricultural building is among the most sightly of the Exposition palaces, its chaste and serious design, its wealth of decorations, and richness and variety of detail, making it one of the most refined and luxurious homes of industry that welcome this gathering of the nations. Fronting on the main court 800 feet, with a depth of 500, and with its eastern façade almost touching the waters of the lake, this structure occupies, apart from its annexes, a space of some nine and a half acres. Built with a careful regard to its effect on adjacent edifices, it was planned in such fashion as to secure the best disposition of its contents, together with the lighting needed for a comparison of the agricultural products of our own and foreign lands, between many of which their delicate shades of distinction cannot be readily detected.



SIGN OF THE ZODIAC

After considering their plan, the New York firm of architects by whom was designed this temple of Ceres, decided to erect their main building around a hollow square, divided in the centre by two open naves intersecting at right angles, and on their sides two-storied aisles, with longitudinal passage-ways through the four courts into which the floor is thus divided. Passing between the Corinthian pillars at the principal entrance, more than 60 feet wide, the visitor enters a vestibule profusely adorned with statuary emblematical of agriculture and agricultural pursuits, the vestibule leading into a rotunda, 100 feet in diameter, and surmounted by a glass dome 130 feet in height. At the top of the building and around it is an arcade, and at the corner are pavilions, also with domical treatment. The edifice is fashioned after the style of the classic renaissance; portions of its walls are painted with allegorical figures, and on the outer sides, as well as in the interior is a luxury of pictorial, sculptural, and other artistic ornaments, relieving the stateliness of the design.



ABUNDANCE, MARTINY

While none but the most captious among the pilgrims of the Fair will be disposed to find fault with this structure, in itself a well-nigh perfect work of art, it has been objected, and not without reason, that nearly one half of the space was devoted to aisles and other passage-ways. To the distribution of that space exception has also been taken; but by the artificers and managers these apparent defects are explained through considerations that need not here be mentioned. To Great Britain were allotted more than 13,000 feet, and to France, a greater agricultural country, only 7,000 feet. Australia has 8,600 feet, while to such great agricultural states as Kansas and California, both with a much larger volume and variety of agricultural production, only some 2,000 feet were awarded. Russia has 9,500 feet, and Italy and Spain but 3,000 or 3,500 feet for each; but in all cases the allotment of space has been regulated rather by the character and extent of the display than by the agricultural output of the territorial divisions here represented.

Adjoining the Agricultural building is a large annex, near one of the stations of the elevated railway, and of which a portion is used as an assembly hall, and as a common meeting ground for persons engaged or interested in agricultural and stock-raising industries. On the ground floor is a bureau of information, where



AGRICULTURAL BUILDING

are attendants whose duty it is to give to visitors such knowledge as they may desire, not only concerning the hall and its purposes, but as to the main building and its contents, with other portions of the Exposition. Here and on the second floor are waiting-rooms and apartments suitable for committees and associations, whose secretaries are always at hand.

In none of the homes of the Fair has sculptural and pictorial embellishment been more happily blended with architectural design. Above the gilded dome is poised St Gauden's gilded statue of Diana, appearing to better advantage as thus transferred to its lofty pedestal from the Madison Square garden in New York. Over the corner pavilions are Martiny's figures of the races, in four groups of colossal female forms, supporting mammoth globes. All are identical in pose, and it is said, produced from a single mould, a different head being placed on each of the models. On the pediments of these pavilions are groups by the same artist, representing a shepherdess with her flock, and a shepherd with his dogs, all in his happiest style. Other of his contributions are those which portray, in classic symbolism, the signs of the zodiac and the emblems of abundance, the fluted drapery of the latter concealing their opulence of form, some holding under their wings the horns of



THE FOUR RACES

plenty, and others with tablets on which are inscribed the names of products emblematic of the seasons. Still another of his groups is typical of agriculture, the tall impersonation of that industry rising above the branching horns of oxen, yet in perfect symmetry and poise. Over the principal entrance is a statue of Ceres, by the Florentine artist Larkin J. Mead, who parted with his treasure somewhat reluctantly, and only because, as he remarked, it would reveal to our American artists what sculpture really is.



Let us hope that his brethren of the craft have laid the lesson to heart.

The decorations in graphic art are by George W. Maynard, of New York. At one side of the main entrance Cybele is seated in her chariot, drawn by lions, and on the opposite side, in a car to which winged dragons are yoked, is King Triptolemus, sent forth by the mother of the gods to instruct all the nations of earth in the science of agriculture. Between them are allegorical figures set in a framework of grain and fruit. At the corner pavilions are figures emblematic of the seasons, and on the friezes above, those of domesticated animals.

In the department of agriculture are included not only the fruits of the soil in the shape of food and forage plants, but all the articles manufactured from those products, whether in solid or liquid form. Thus in one group we find bread and biscuits, starches and pastes; in another, sugars and syrups; in a third, malt and



SECTIONS OF AGRICULTURAL BUILDING



PANEL, AUTUMN, MAYNARD

Chicago is the main centre of distribution, and supply, the Exposition has no more attractive features than its Agricultural and Live-stock departments, the latter presently to be described. Of the entire grain receipts of that city, valued for 1892 at about \$150,000,000, from eighty to ninety per cent is shipped to domestic and foreign markets, where also is forwarded either on hoof or as meats and lard, as hides and wool, the bulk of its live-stock consignments, representing for the same year a valuation of more than \$250,000,000. The region tributary to Chicago, including, as it does, a wide section of the western and middle states, is largely devoted to agriculture and stock raising, furnishing indeed a very considerable proportion of the food supply of the world.

In all the United States there are probably not less than 10,000,000 persons engaged in various branches of agriculture, while each one so engaged supports on an average at least two other persons. Thus it will be seen that nearly one half the population of the republic is directly dependent on agriculture for a livelihood, the



GROUP BY MARTINY

alcoholic liquors, wines being represented in the Horticultural division. Here also are meats, smoked, salted, canned, or as extracts, and in a separate structure, the products of the dairy. Agricultural machinery, implements, and processes are fully represented, with fertilizing substances, both animal and mineral. There are farm buildings, models, methods, plans, and statistics, and classed in this division, though housed elsewhere are exhibits of Forestry, and all that the forest supplies.

To the residents of the several states of which



PANEL, CYBELE, MAYNARD

number actually employed far exceeding those engaged in all other fields of labor. Add to this the part that agriculture plays in our commerce, our manufacturing, shipping, railroad, and other interests, and it probably surpasses in economic, if not in money value, all other productive industries combined. While in some directions, and especially in cereals, over-production has been followed by a heavy decline in prices, leaving but the smallest margin of profit, and in unfavorable years a positive loss, the more intelligent farmers have fully held their own, many of them raising a variety of products, and with special regard to present and prospective demand.

In no country in the world are there so many farms of considerable size held and worked by individual owners. If in France, Belgium, and a few other countries, there is, in proportion to population, a larger number of proprietary farmers, the average of their holdings is by comparison almost infinitesimal. Of the 600,000 or 700,000 Belgian farms, for instance, nearly one-half do not exceed ten acres; many have less than five acres, and instances are not rare where a family is supported on a single acre. Of the 5,000,000 farms under cultivation in the United States, at least 3,500,000 are worked by their owners in holdings of from 50 to 500 acres, and of farmers with more than 500 acres there are more than of those with ten-acre patches or less. Of tenant farmers there are about 500,000 who pay a money rental, and perhaps twice that number whose rent consists of a certain portion of their crops.

Of the entire area of the United States, less than one-half is included in its farms, and less than one-third is under actual cultivation, the remaining half still containing fertile tracts, though most of it consists of grazing lands, of water surfaces, of mountain ranges, and of the desert lands west of the Rocky mountains. Meanwhile the more valuable portions of these lands are being absorbed under the provisions of the homestead and timber

acts, located with scrip and warrants, or selected by railroads, at the rate of 15,000,000 to 20,000,000 acres a year. In other words, a territory almost as large as that of New England, excluding the single state of Massachusetts, is being segregated every twelve-month from that which is left of the national domain.

During the five years ending with 1892, the United States produced an average crop of more than 3,000,000,000 bushels of cereals, maize ranking first as to volume and value of production, and next, in the order named, oats, wheat, barley, rye, and buckwheat. In 1892 the acreage under cultivation was somewhat smaller than in 1888, and with a more considerable



SYMBOLICAL GROUP



QUADRIGA ON PERISTYLE



MARTINY'S AGRICULTURE

reduction in yield. The best of the intervening seasons was in 1891, when from 142,000,000 acres were produced 3,400,000,000 bushels, worth \$1,600,000,000, or an average of 24 bushels, but with a money value of less than \$11 to the acre. For the following year the total crop fell to 2,800,000,000 bushels, and the average to 20 bushels, with a slight reduction in acreage, and proportionate returns. Of wheat there were produced in that year 516,000,000 bushels; of maize, 1,628,000,000, and of oats, 661,000,000 bushels, with acreages of 13, 23, and 24 bushels respectively. Considering the low prices then prevailing, and the still lower rates current during the following harvest season, it will be seen that except on a large scale, and with the most improved of labor saving appliances, the production of cereals is no longer a profitable industry.

Of hay there were produced, in 1890, some 40,000,000 tons from about as many acres; of cotton, 7,400,000 bales from 20,000,000 acres; of flax, 10,250,000 pounds of seed, and 240,000 of fibre from 1,300,000 acres. Of tobacco the average production may be stated at 500,000,000 pounds; of rice, one-fourth of that quantity, and of cane, beet, sorghum, and maple sugar, 400,000,000 pounds, or little more than ten per cent of the consumption; for the United States is a great sugar consuming country, using at least 60 pounds a year per capita of its population. Such are in brief the recent annals and the present condition of leading agricultural interests as repre-

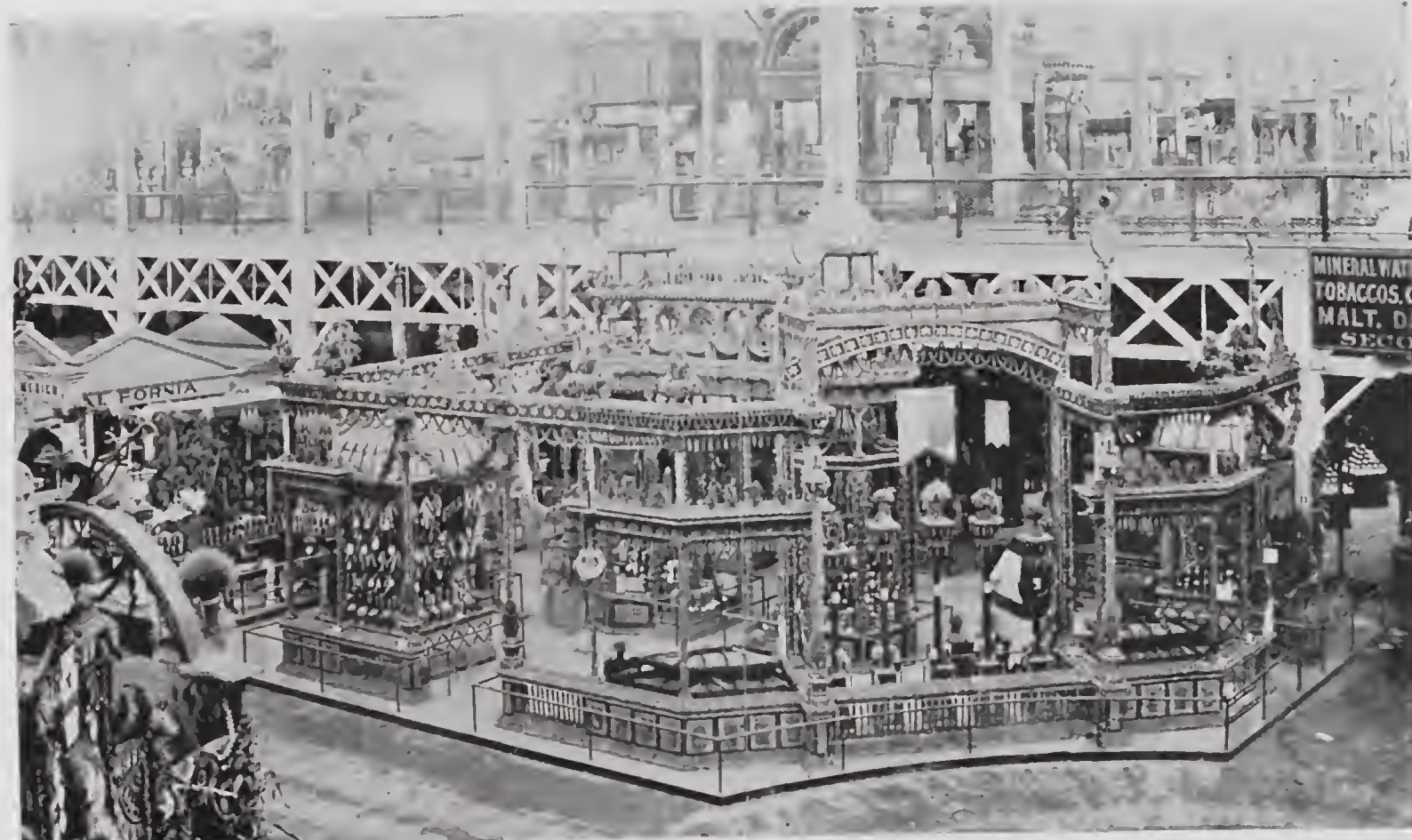


ROTUNDA

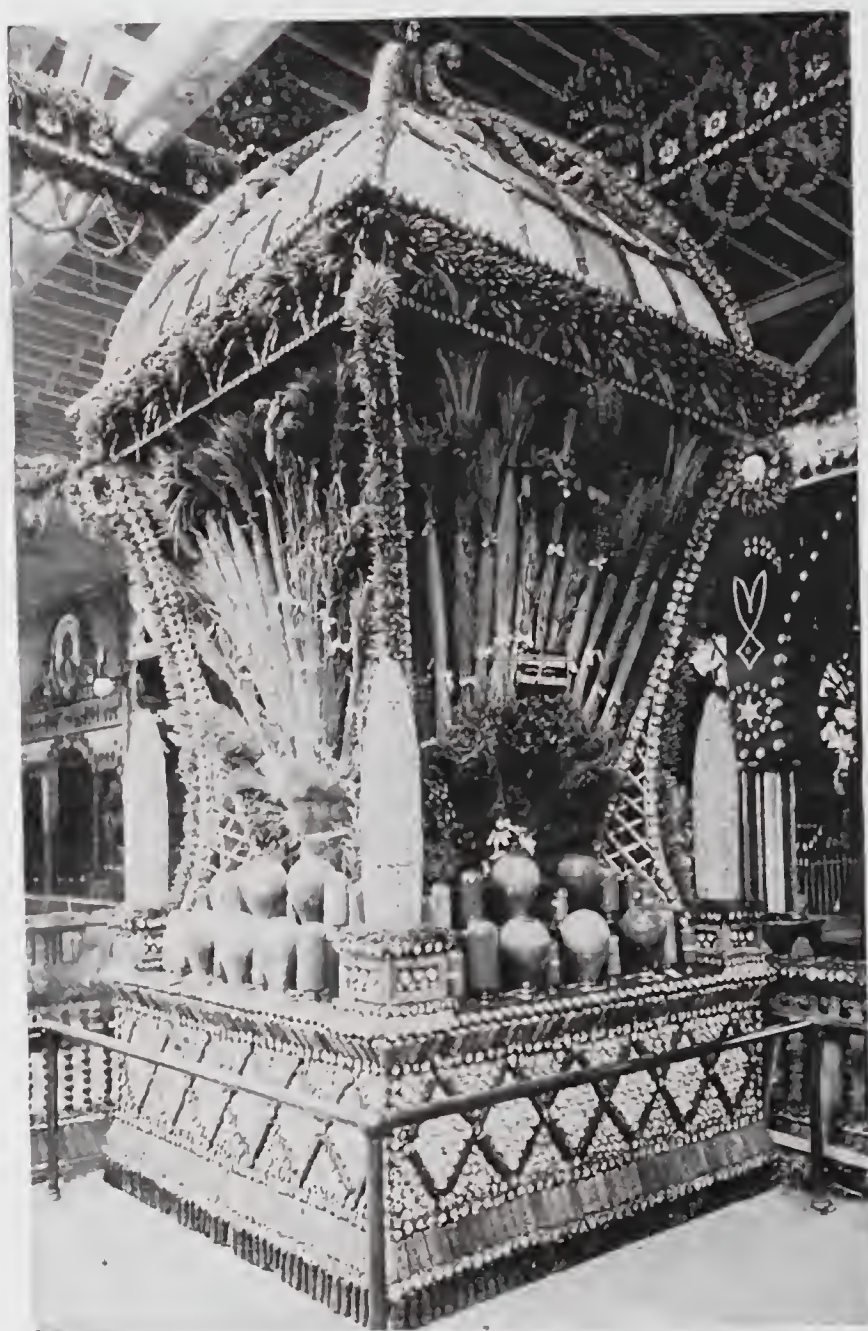


sented at the Fair, and nowhere can be compared to better advantage the products of the great food-producing sections of the republic, and these again with the products of foreign lands.

Between the annex and the central transverse nave of the main hall are the exhibits of the various states, of the American agricultural colleges, and experimental stations, and several minor foreign countries. Fronting on this nave are the pavilions of the leading agricultural states, including Iowa, Illinois, Ohio, Indiana, Minnesota, Wisconsin, Michigan, Nebraska, New York, Pennsylvania, Kentucky, and North Carolina. Iowa occupies a central



IOWA PAVILION

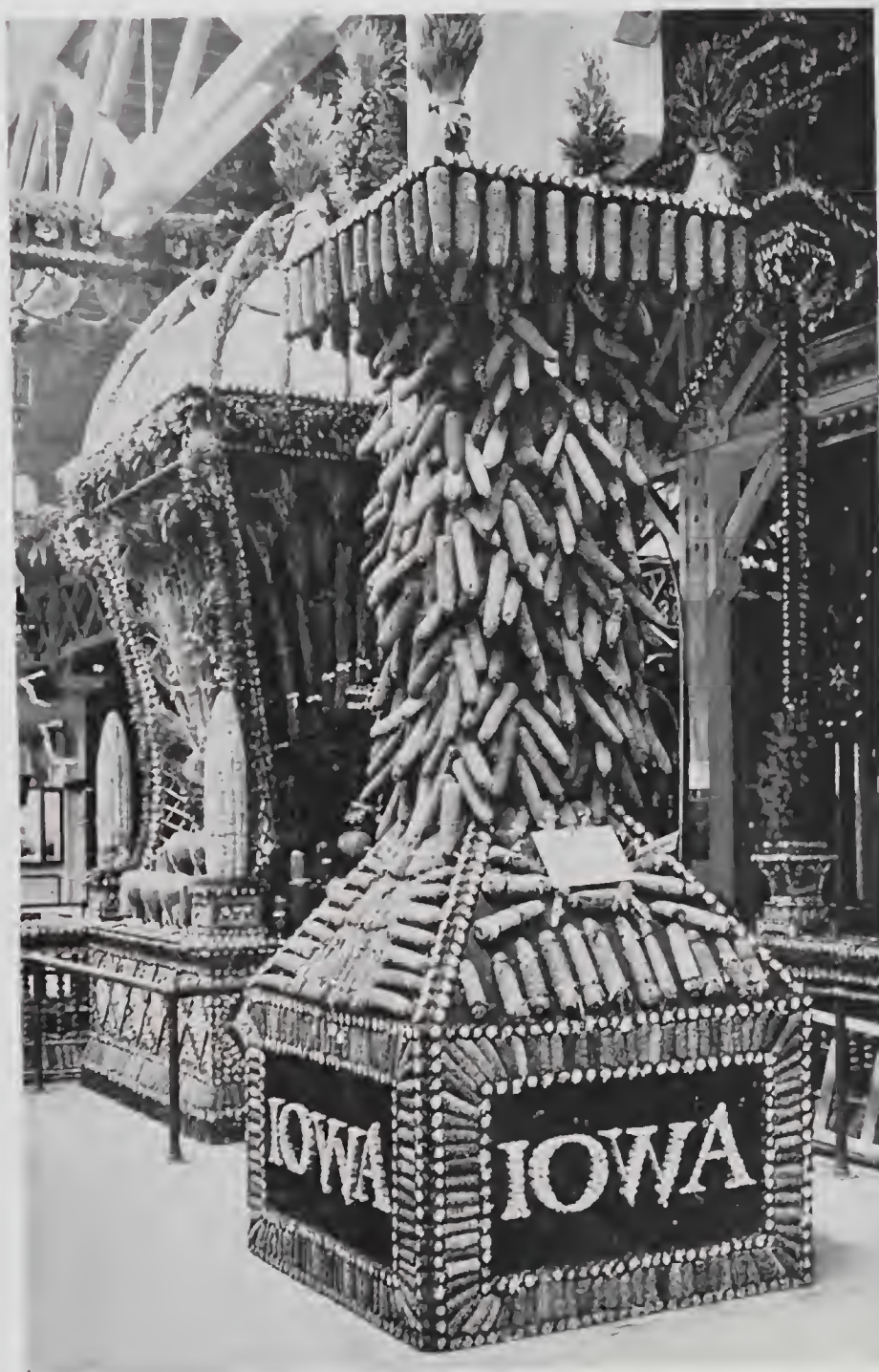


IOWA EXHIBIT

position among the sisterhood, and one in perfect keeping with her geographical position. In her palace of corn, built in the Pompeiian style of architecture, are contained more than 130 varieties of grain. In front is a railing formed of long glass tubes, filled with samples of her soil, the caps above them composed of grains and other products. Red, white, and blue corn decorate the arches and pillars of the interior, in imitation of mosaic work, and at the base of each column are wisps and sheaves of grain. The pyramids within the palace, and the domes which surmount it, are artistically fashioned of corn cobs, kernels, and husks, while the less attractive exhibits, but those which better illustrate the cereal wealth of the state, are classified and arranged as grain in and out of the ear. The pavilion covers an area of more than 2,000 square feet, and aptly represents a form of industry in which at

least two thirds of the exhibitors are engaged.

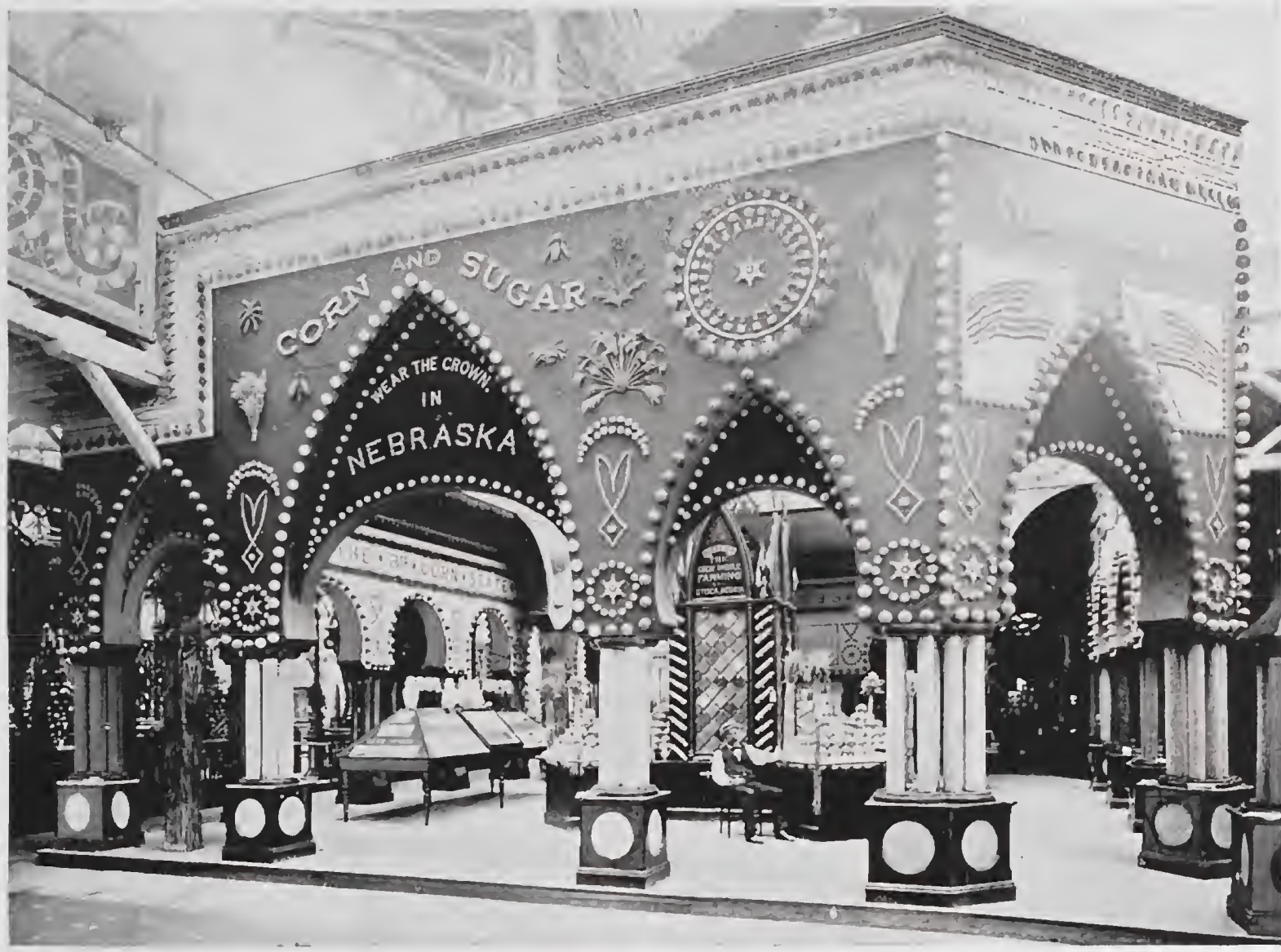
The pillars which support Nebraska's spacious pavilion are filled with her corn, wheat, and other grains, the first of these products being most extensively used in the decorations. One of the most important of her industries is the raising of corn for the manufacture of brooms, and these household articles are fashioned into several unique designs. In the centre of the Michigan section is a Corinthian temple, surmounted by a shield bearing her coat of arms. Above the main entrance is represented a family group, fashioned in corn and wheat, its four members on their way to the harvest field. The exhibits come



IOWA EXHIBIT

from all portions of a state whose surface and soil are greatly diversified, and hence are of a miscellaneous character, including wheat, corn, oats, rye, peas, beans, buckwheat, timothy, and clover, with many varieties of seeds, nuts, and vegetables, and a small display of melons.

Wisconsin's oaken pavilion, whose sides are formed of glass compartments for the display of cereal products, is typical of that substantial and prosperous state, while in the grouping of different grains in beautiful designs, and the decoration of the pillars and roof with the fruits of her soil are expressed the artistic tastes of one of the most cultured of western communities. There



NEBRASKA PAVILION



NEBRASKA EXHIBIT

are also photographs of model farm buildings, and of rural scenes, with a series of colored maps contributed by the chief of the weather service, representing climatic changes and conditions. The exhibit includes, in nearly 1,000 classes, all grades of wheat, corn, oats, barley, rye, buckwheat, peas and beans, with seeds of many varieties, as flax, timothy, red top, blue grass, millet, caraway, and clover, with hops, German vetches, and sorghum, and with grasses and forage plants of more than sixty kinds.

Heads of grain and native grasses form the appropriate materials of which largely consists the decorative scheme of the Minnesota pavilion, planned in a series of arches, and with pillars festooned in cereal and floral designs. Its chief ornament is the octagonal tower upon whose panels are pictorial effects in wheat and grasses, emblematic of the history and resources of the state. Among the grains, which are displayed in jars barley is a prominent variety, for in Minnesota a strong effort is being made to encourage the raising of this cereal for consumption by Canadian maltsters.

Facing the south-eastern section of the rotunda is Pennsylvania's exhibit, housed in a structure whose base is of many colored corns arranged

in geometric figures, with wreaths and borders of feather-like grasses. The roof and entrance are also decorated with designs in wheat and corn, while above all its rich display is a bust of William Penn, calmly surveying the agricultural evolution of by-gone ages. On one of the panels are reproduced the arms of the state—two sturdy farm-horses, one of them in its harness, with a shield surmounted by an eagle, and the well-known Pennsylvania motto, Virtue, Liberty, and Independence. On either side are panels covered with green moss, and serving as a

Michigan's section is a large, multi-level display. The top level features a bust of William Penn and several figures, including a woman in a long dress and a man in a suit. The middle level has a large sign that reads 'MICHIGAN'. The bottom level is filled with various agricultural products, including stacks of grain and other displays. The entire exhibit is highly decorative and detailed.



MICHIGAN'S SECTION



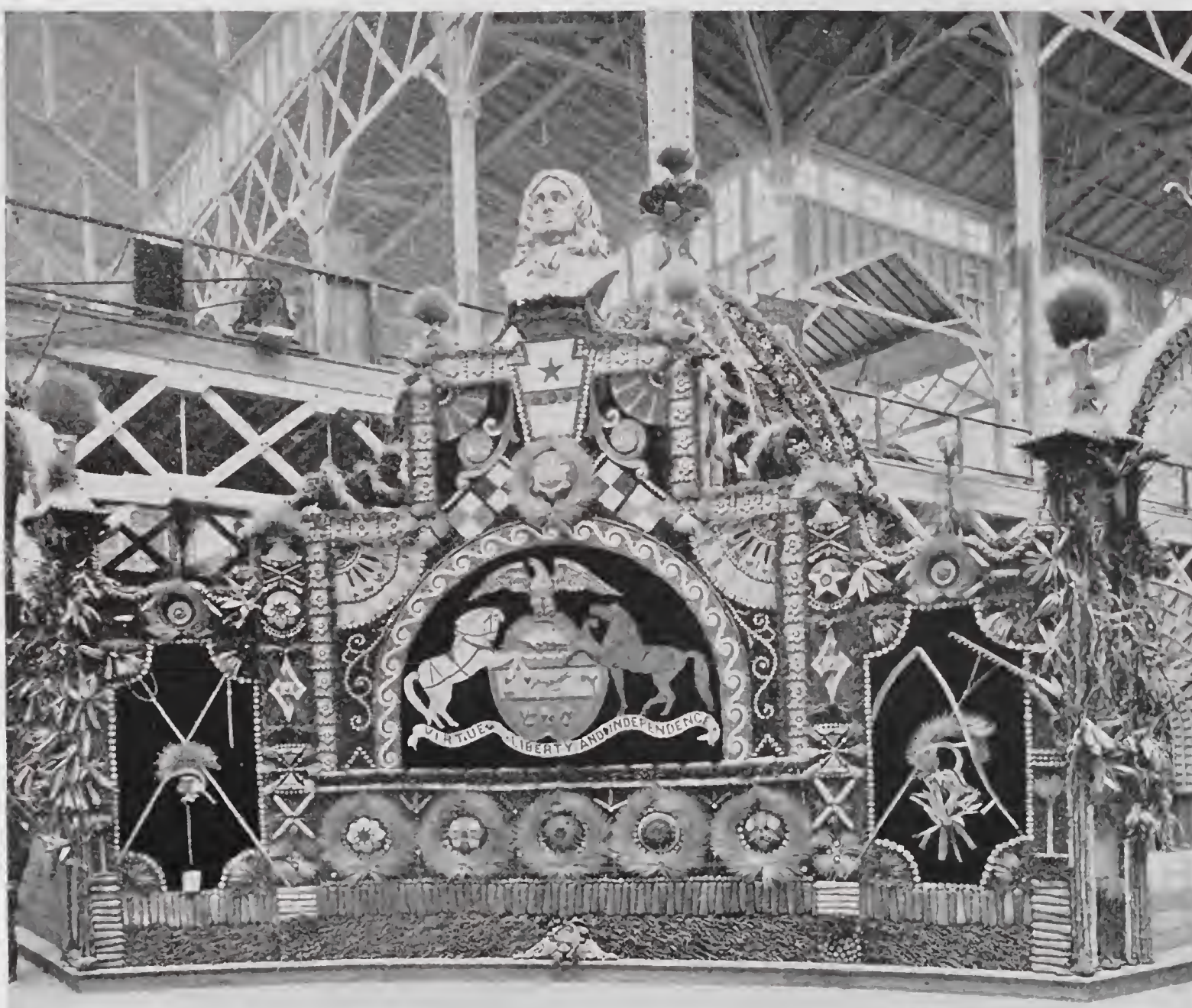
background for a group of agricultural implements adorned with ribbons, and wreaths of grass. Above the coat of arms is a keystone, fashioned of kernels of white and yellow corn. The keystone in truth is omnipresent, and in every conceivable design, so that never for a moment is the visitor allowed to forget that this, the so-called keystone state, is the one which held together the sections of the union in their hour of sorest trial.

With its quaint and yet tasteful embellishment,



FLOUR EXHIBIT, MINNESOTA

its old-fashioned fireplace, where the chimney-piece, the chimney ornaments, and even the andirons are made of corn, the pavilion, with its wealth of decoration, forms of itself a more interesting display than its contents can possibly be. Among the latter are grains, grasses, and seeds in many varieties, with specimens of hops, and a case filled with tobacco in the leaf. An interesting exhibit is that of the Woman's Silk Culture association, whose headquarters are in Philadelphia. In the form of an illustration is the silk-worm feeding on the mulberry leaf, and near by are glass jars filled with cocoons, and bundles of raw silk, and spools of sewing silk, the latter in every shade of dye. Adjacent to this group are rich silken fabrics and festoons of flags draped around a goodly array of diplomas from prominent agricultural societies.



PENNSYLVANIA PAVILION

In a choice collection of photographs are represented Pennsylvania farm-houses of ideal type, embowered in orchards, and overlooking fertile fields. Tasteful and homelike are these habitations, some of them, though almost coeval with the declaration of independence, showing no signs of decay. Worthy of note also are the charts and handsomely bound agricultural reports, in which is a statement of the agricultural and mining products, and the commerce of Pennsylvania as compared with the sisterhood of states.

Next to the Pennsylvania collection is the pavilion of Illinois, one of the most ornate in the American section, though sharing the honors with other structures, and especially with that of Iowa. A commendable

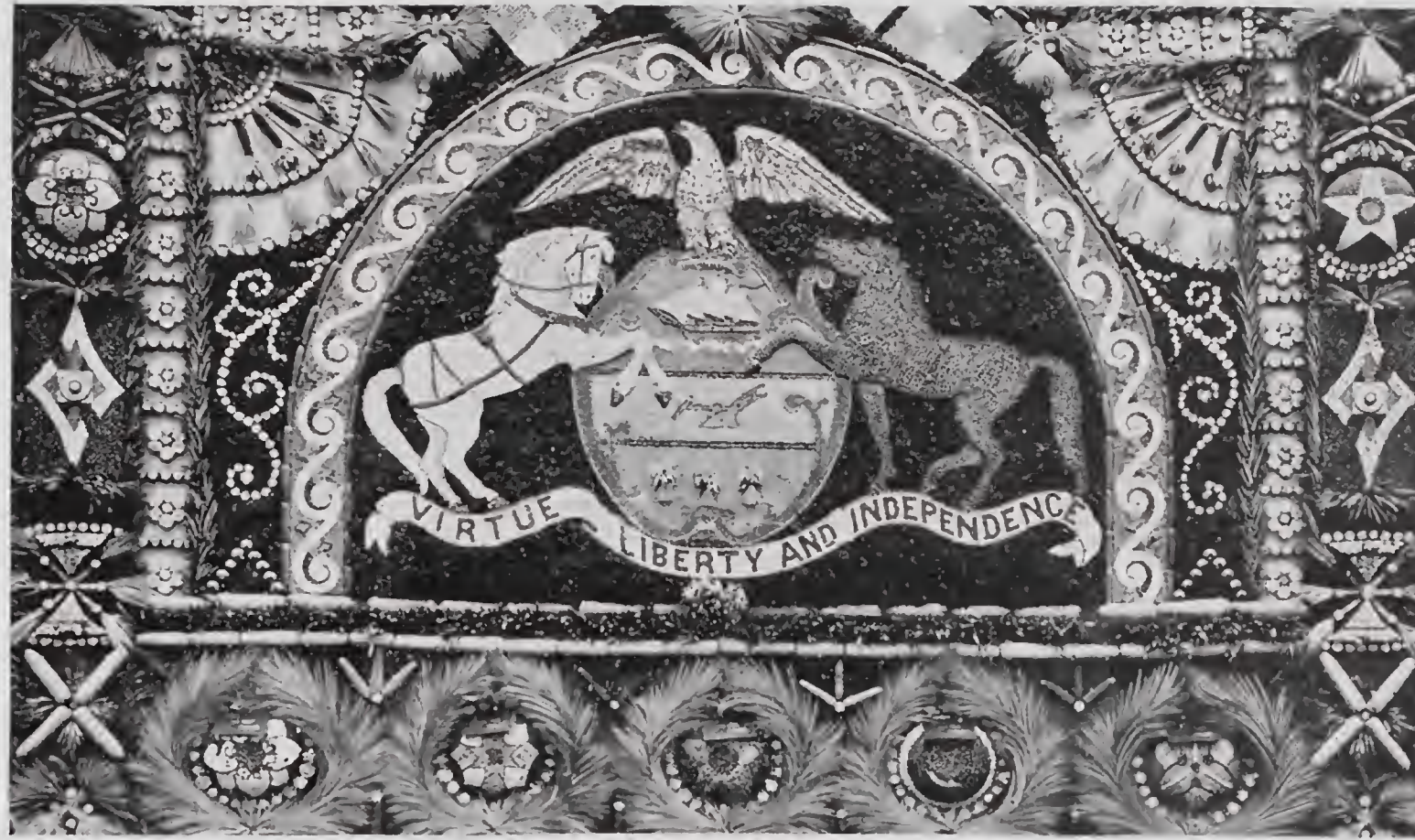


PENNSYLVANIA SEED AND GRAIN

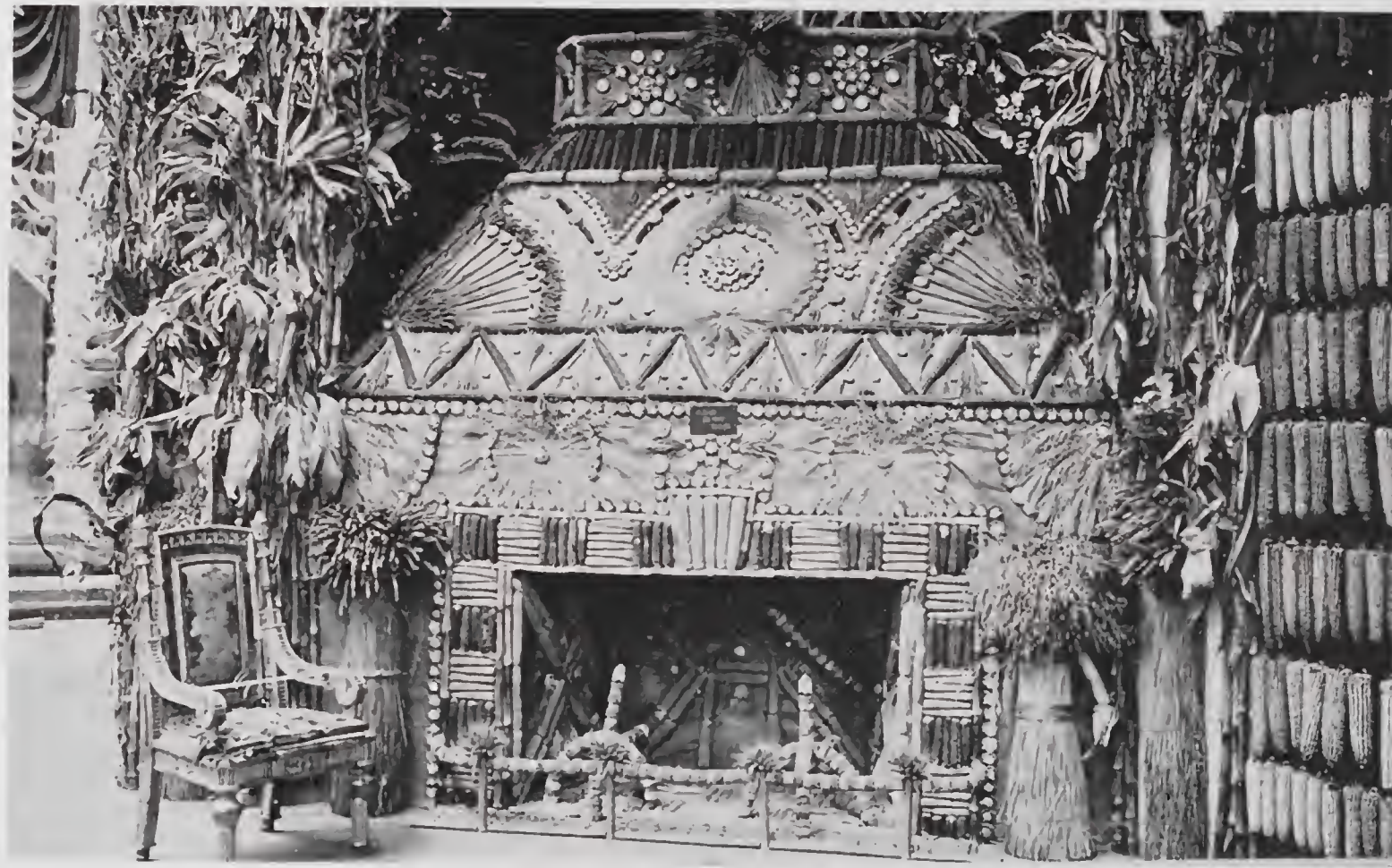


THE COLONNADE

feature, and one that is lacking in many portions of Agricultural hall, is its plentiful supply of comfortable seats, thus making it a favorite resort for tired visitors. There are four entrances to this pavilion, and in its centre is a corn pagoda, its base composed of jars of grain, and aptly representing one of the leading industries of a state whose crop of maize has averaged for a score of years more than 200,000,000 bushels. In glass cases set into the walls are numerous specimens of cereal and other produce, the several groups including many kinds of grain, grasses, and forage plants.



COAT OF ARMS, PENNSYLVANIA



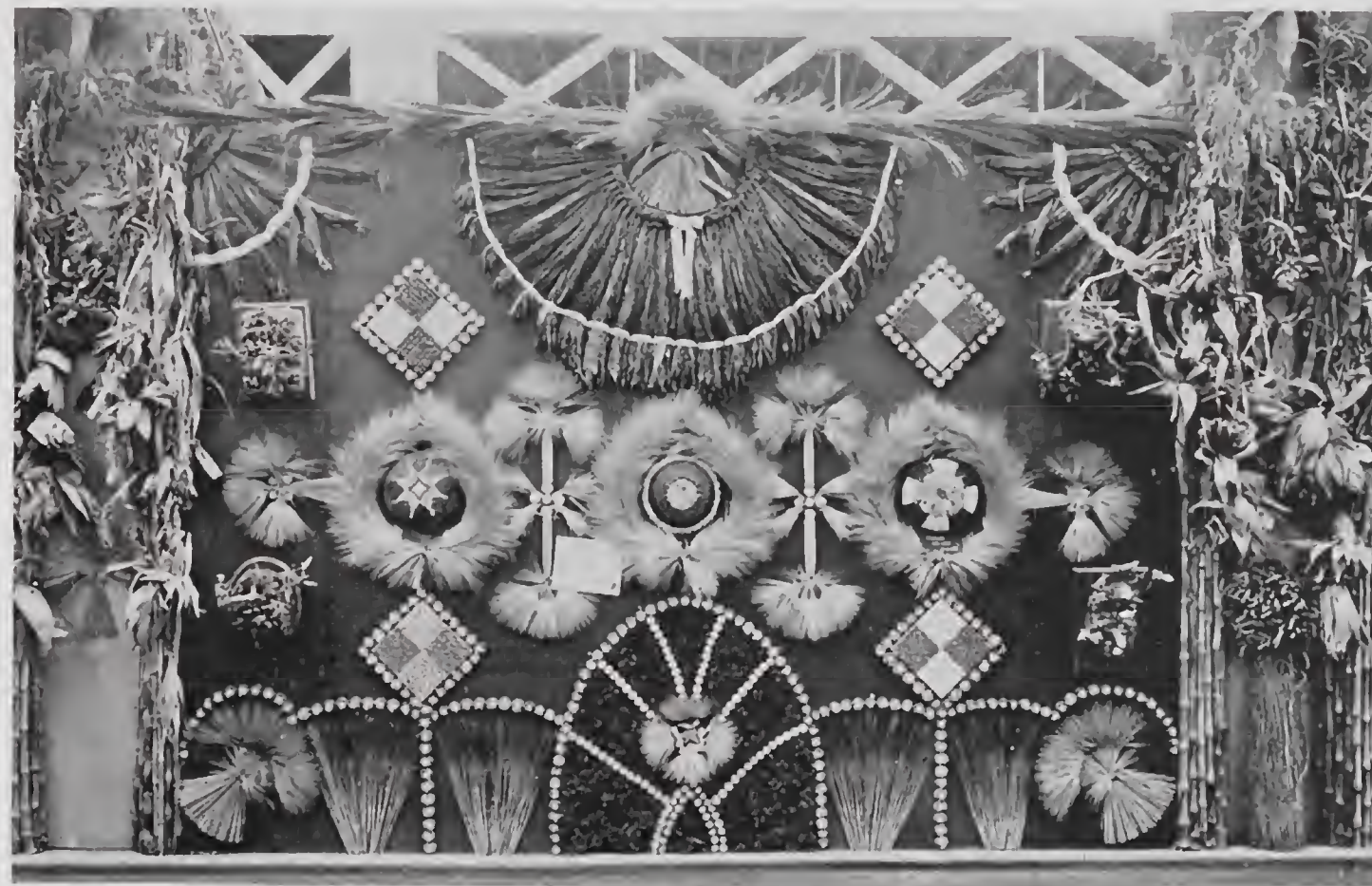
GRAIN AND SEEDS, PENNSYLVANIA

Two of the groups consist almost entirely of vegetables and broom corn; a third of sorghum, and sugar-cane; a fourth of tobacco, hops, and peppers, and a fifth of hemp, flax, and cotton. Worthy of note is the variety of articles displayed by single exhibitors, many of whom show, side by side, their samples of wheat, corn, oats, barley, rye, buckwheat, grasses, and forage plants, thus illustrating their diversity of products, for the Illinois farmer, like the Illinois merchant and manufacturer, is fully abreast of the times.

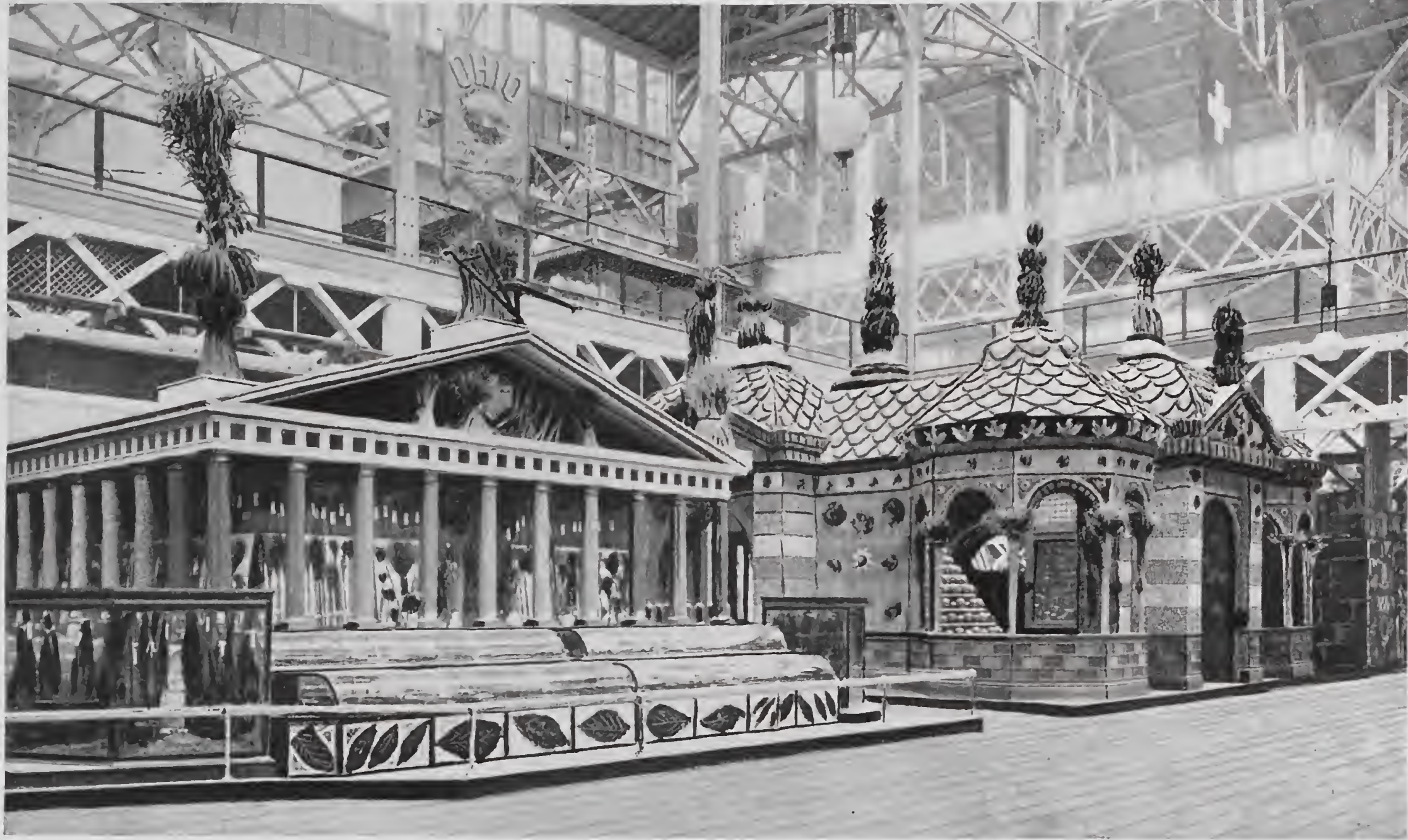
In structural design the Ohio pavilion resembles somewhat a Roman temple. The

glass columns which surround it are filled with cereals so arranged as to present a pleasing color effect; the cornice is also composed of glass compartments, through which the grains of Ohio are exhibited in all their variety and richness, and on the walls in various receptacles, or in the form of interior decorations, are 130 varieties of wheat, 128 of corn, 37 of oats, and 102 of grasses, with a creditable display of beans and tobacco. In the centre is an office with reception room, in which is a collection of standard works on agriculture.

In Kentucky's pavilion leaf tobacco, corn, wheat, hemp, grasses, and blue-grass seed form the bulk of the exhibits, all of which are

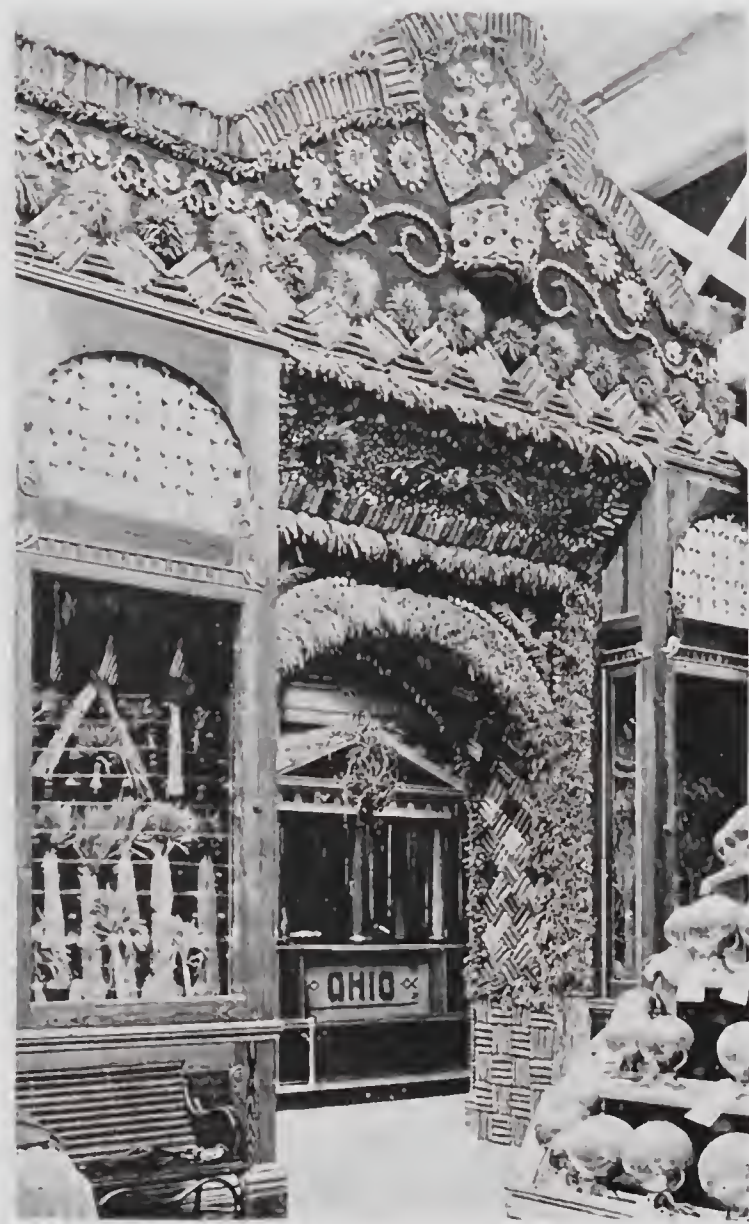


ORNAMENTAL DESIGNS IN GRAIN AND SEEDS, PENNSYLVANIA



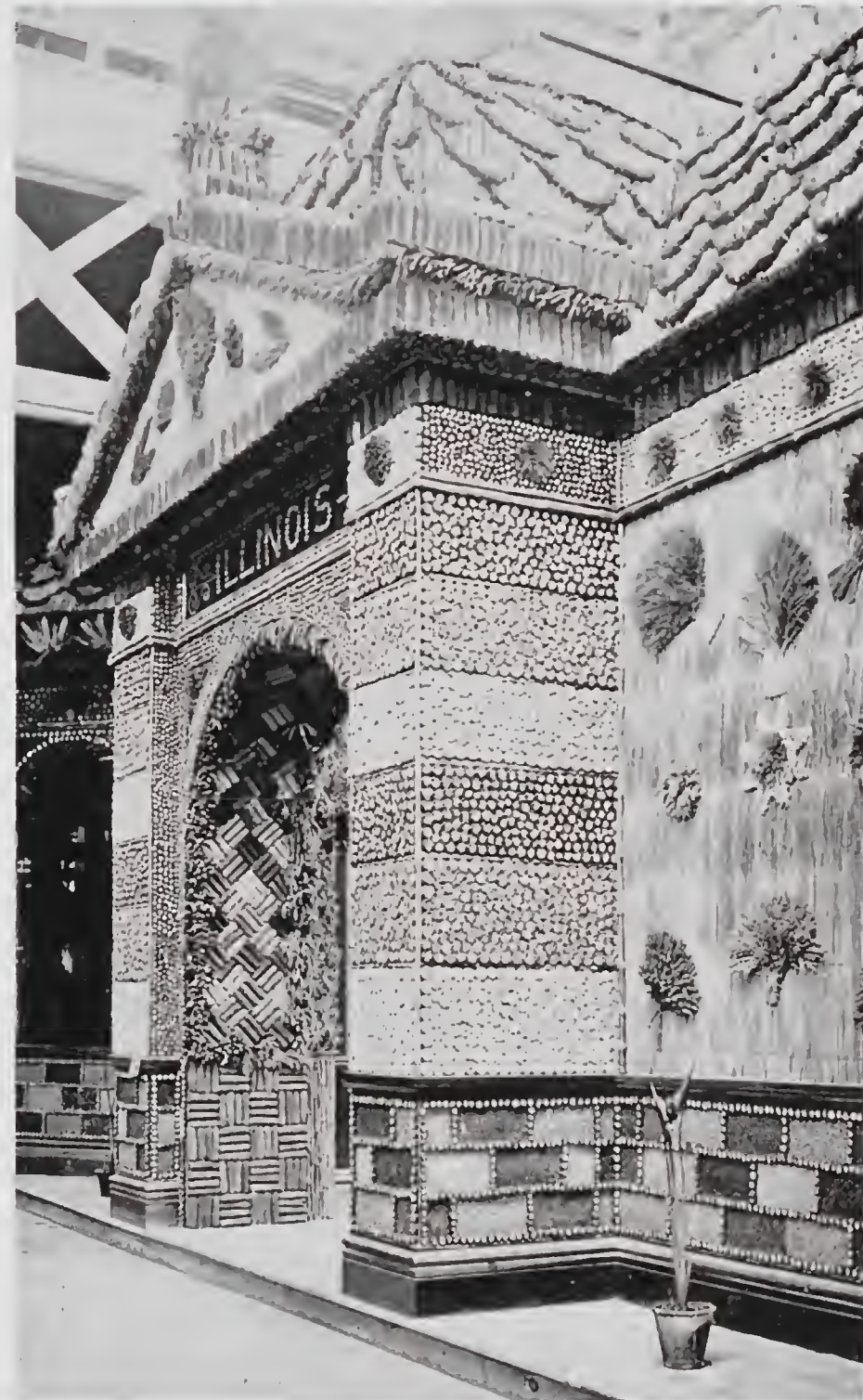
OHIO AND ILLINOIS PAVILIONS

worked into structural forms or otherwise skilfully arranged. Of the three groups under which the collection is classified the largest consists of tobacco, of which there are more than a hundred exhibitors, the description known as Burley leaf being repeated in several score of specimens. Indiana, whose section lies east of the Kentuckian group, is liberally represented, as befits a state which ranks among the foremost in volume and quality of cereal products, displaying also many varieties of grasses, hay, and seeds.



SECTION ILLINOIS PAVILION

Indiana's exhibits are installed in a pavilion of white, the section fronting the façade being decorated with corn in the ear, and grain in the straw. Within there are three large structures, covered with jars filled with the cereals of the state, a shaft of corn, not unlike an Egyptian needle, rising above them all. In cases are other specimens of wheat and oats in the stalk, collected by the head of the agricultural experiment station, of Purdue university. An artistic



ENTRANCE, ILLINOIS PAVILION



SECTION OF THE MISSOURI EXHIBIT

feature is a large wreath of artificial flowers on one of the cases, made by a woman from many varieties of grain and nuts, and containing also a grasshopper, bee, beetle, guinea egg, pinching bug, and the tusk of a hog. To the Indiana exhibit the weather bureau contributes several maps, showing the precipitation, temperature, and rainfall within the state for a period of twenty-two years, and elsewhere are maps presenting data as to altitudes, drainage,

live-stock, and agricultural products.

The home of the empire state, somewhat out



MISSOURI CEREALS



THE BRIDGE MISSOURI PAVILION



ENTRANCE, MISSOURI PAVILION

of place, as it would seem, among the western and southern exhibits, is a plain, unpretentious structure, almost severe of aspect; but in the several groups and several hundred classes contained therein is one of the best and largest collections in Agricultural hall, arranged with skill and method, and displaying to excellent advantage her manifold products and resources. As in other sections, grain forms the bulk of the display; but of beans there are nearly 100 specimens, with grasses, leaf tobacco, hops, flax, and syrup made from the cane. The picking and preparation of hops, one of the most picturesque of out-door industries, are fully illustrated, and flax in its various forms, from the time it is harvested until

made ready for the manufacturer, is also a feature in the New York collection.

North Carolina completes the group of states that fill the place of honor fronting on the central nave, which is thus divided among the middle, western, and southern sections of the country. In her glass pavilion, divided into convenient partitions, the first group consists of cereals, grasses, and grass seeds, in more than 350 classes. Then come sorghum, and sorghum and sugar-cane syrup and seed, of which there are some fifty exhibitors. A third group consists entirely of peanuts, and a fourth almost entirely of beans. In another



ENTRANCE, NEW JERSEY PAVILION



CORNER OF NEW JERSEY PAVILION



NEW JERSEY CEREALS

a shaft of grain, surmounted by a terrestrial globe of silk, with the state of Missouri in exaggerated scale. On either side of the arched doorway at the principal entrance is a case containing the choicer varieties of Missouri grasses, and grains, tobacco, flax, hemp, sorghum, and castor beans are elsewhere displayed in nearly 200 classes.

Around the stairway leading to the gallery which divides this section is a palace of corn, which serves as an office and reception room. Here is illustrated in the form of statistics and maps the growth of a leading branch of Missouri's industry, her corn crop reaching, and at times exceeding 200,000,000 bushels a year. All classes of cereals are also displayed in the shape of a terraced



GRAIN ARBOR, NEW JERSEY

embankment, composed of jars of grain, and surmounted by an equestrian figure of Washington. A model of the great St. Louis bridge, fashioned of sugar-cane and ornamented with grain, occupies another portion of the pavilion, in the construction and decoration of which there are samples enough to load a sea-going ship.

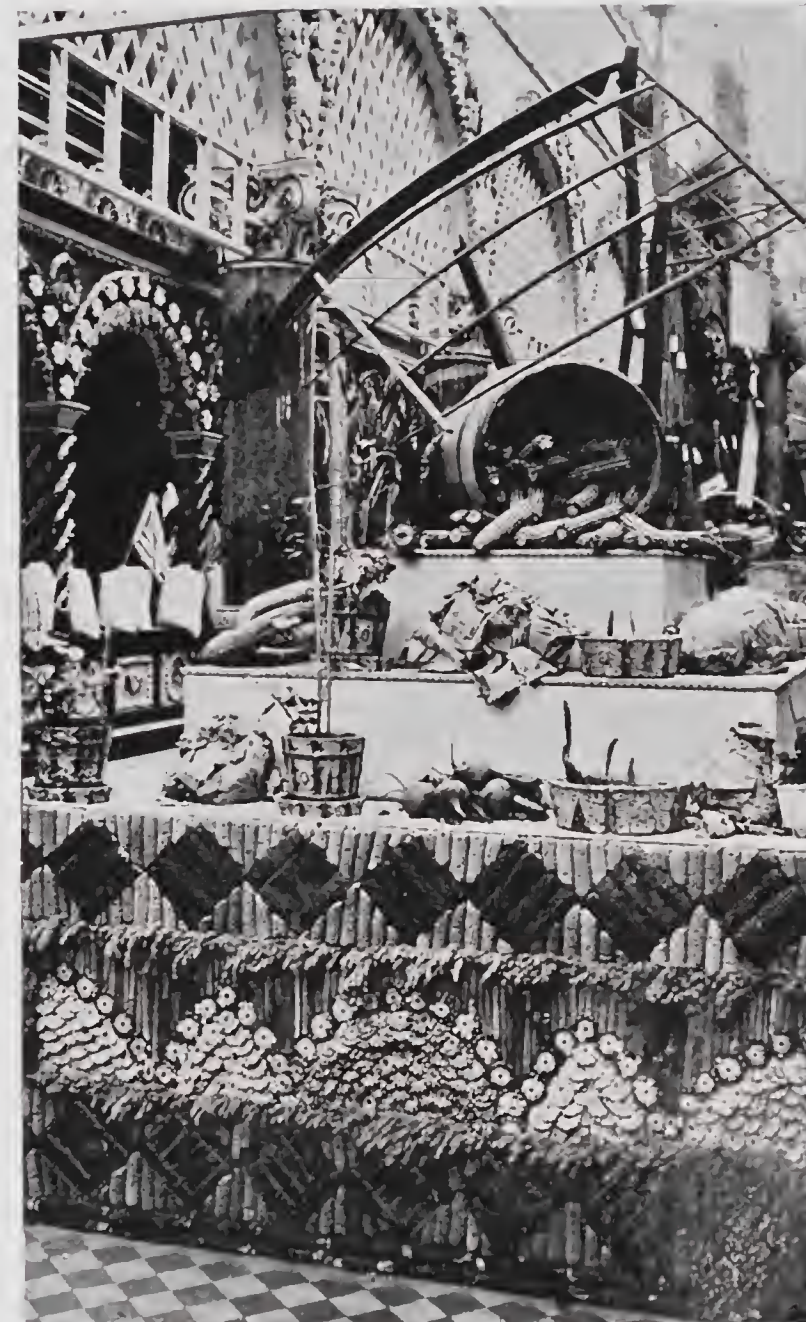
Except for Louisiana, the remaining exhibits of the southern states are grouped to the east of Missouri's pavilion. Here the two Virginias and Florida display their modest assortments in neat and tasteful pavilions, the Old Dominion giving the place of honor to tobacco with her wheat, corn, and oats in the background, while her western namesake reverses this arrangement. The state commission, the Louisiana Sugar exchange,

and the New Orleans board of trade and Cotton exchange were mainly instrumental in organizing a series of exhibits which illustrate the methods of cultivating, harvesting, and milling rice; of producing sugar, molasses, and syrups, of raising cotton, and manufacturing cotton seed oil. They have also a large display of tobacco and cereals, together with specimens of soils which experiment and chemical analysis have shown to be best adapted to staple products.

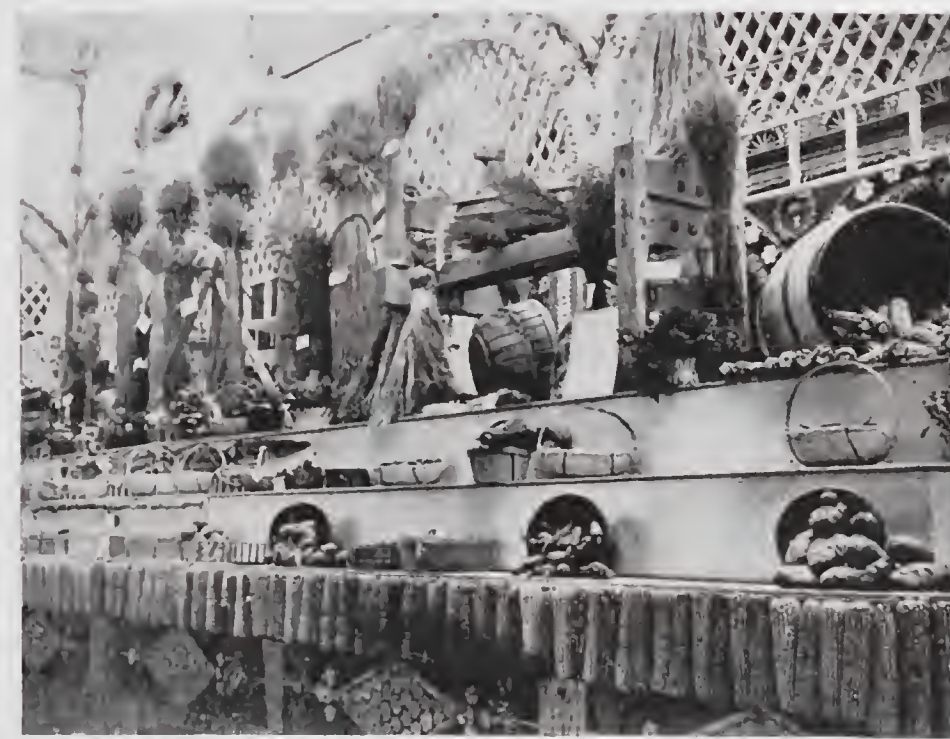
In the exhibit of the Louisiana Sugar exchange are photographs representing plantation laborers, warehouses and other buildings for handling manufactured products, and scenes within the exchange itself. The state exhibit

group cotton lint, seed, and bolls are repeated in two-score specimens, and among them is a little flax and flax-seed. Of hops and tea there are single exhibits, and of interest to scientific agriculturists are the samples of the soils best adapted to staple products.

Near the eastern portal Missouri occupies one of the largest sections allotted to a state exhibit. An ornamental railing encloses the pavilion, which is in four compartments, and in the centre a pyramid, on whose sides are worked in grains and grasses the Missouri coat of arms, the seal of the United States, and a Columbian medallion. From this pyramid rises



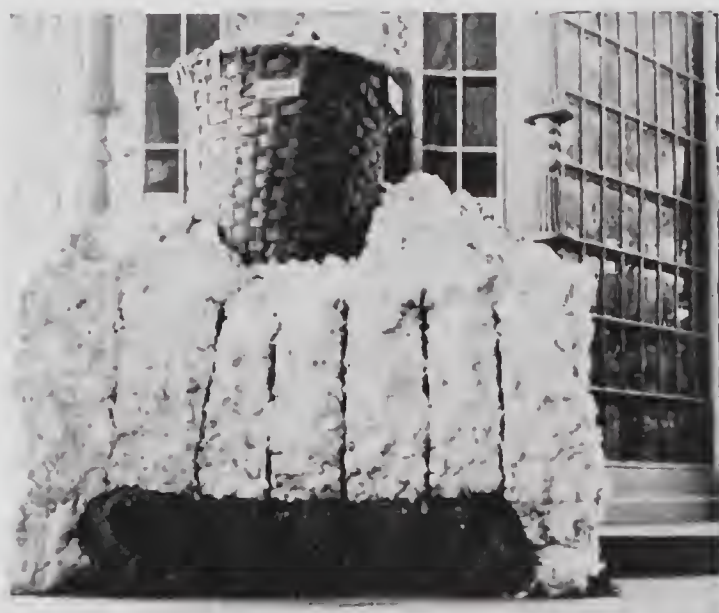
IN NEW JERSEY PAVILION



SOME NEW JERSEY EXHIBITS



CEREALS



COTTON, NORTH CAROLINA

is divided into two main sections, designed to illustrate the development of the rice and the sugar industries. The so-called rice pavilion is thatched with the straw of that grain, resembling somewhat one of the Javanese houses on the Plaisance. It is surmounted by a marine monster in upright posture, with large eyes of bright colored glass. The pillars and walls of the sugar pavilion are of cane, both structures displaying the most artistic workmanship, and so arranged that they appear as one.

A portion of the Florida section is occupied by a Grecian pavilion, which serves as the official headquarters, tastefully furnished with exterior decorations of tropical plants, jute, sugar-cane, and other native products. Among the exhibits are samples of soil re-

claimed from the coast lands and everglades, those of the produce of the soil consisting of specimens of sugar, rice, cider, wines, honey, preserved fruits, and early berries, the last including a jar of strawberries gathered in the month of February. The small but tasteful and well ordered collection of Maryland completes the southern display, except for an assortment of Texan wools contained in the gallery. North and east of the Maryland pavilion are those of New Jersey and Delaware, the contents of which are to be commended for quality rather

than quantity. Especially neat and home-like is the display of New Jersey products, above which is inscribed the following legend: "The battle ground of the Revolution, on whose fields many of these exhibits were grown."

The New England participants are Massachusetts, Connecticut, New Hampshire, and Maine. Tobacco is a feature in the exhibits of the first two states, notwithstanding that in the former its cultivation has been strongly opposed by certain classes. The exhibit of Massachusetts is skilfully arranged, and includes photographic illustrations of many of her crops, with literature bearing upon agricultural topics. As an exposition of New England husbandry, which differs widely from western methods, a considerable space is devoted



AN EXHIBIT FROM SOUTH DAKOTA

to what is termed intensive farming, ravages of the gypsy moths, and other insect plagues. Within a glass case is a tree covered, and partially destroyed by the worms, with birds perched on the trunk, and barn-yard fowls at the base in the act of devouring them. New Hampshire has an attractive display, in a small red building enclosed with a rustic fence, and representing the typical New England granary, near which are tables covered with jars of grain. In the yard are benches and easy chairs, an old-fashioned flax-wheel, plough, and other agricultural implements of colonial times. On either side of the door are compartments

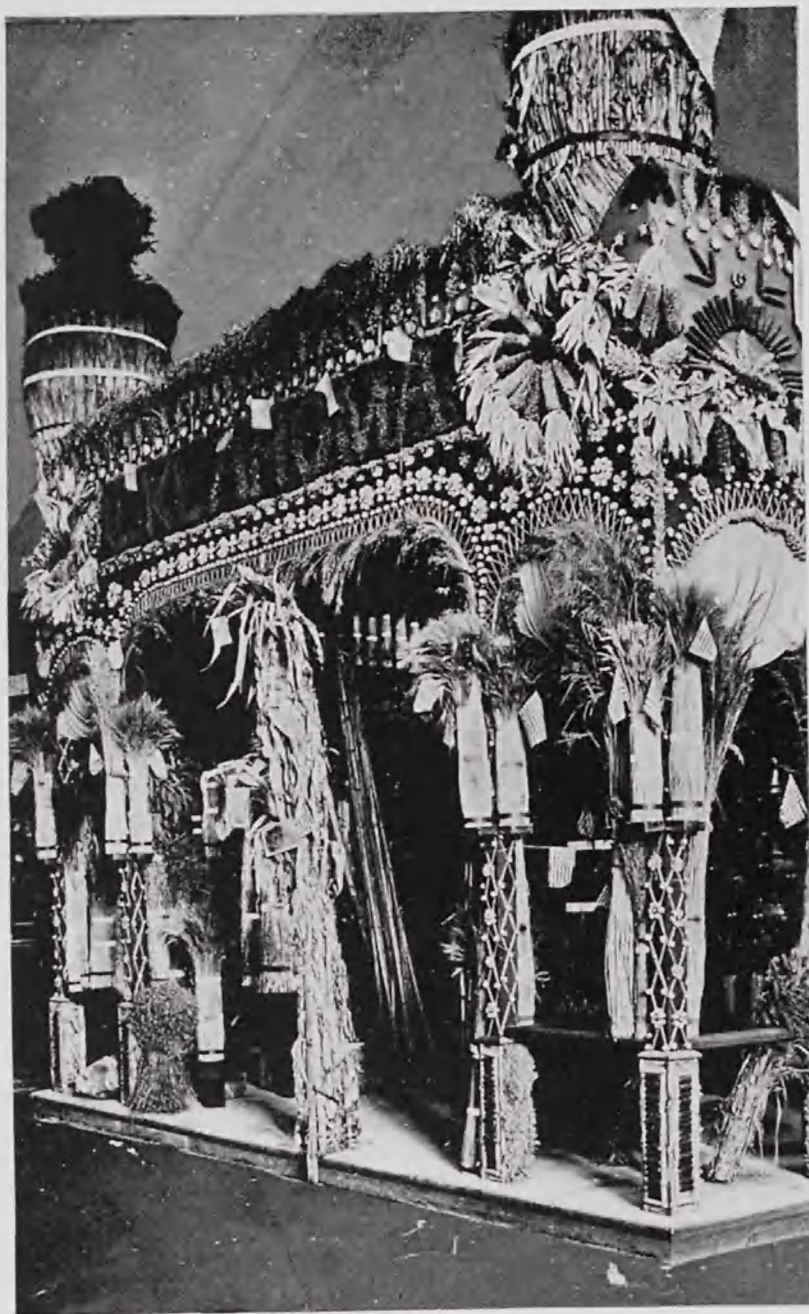
Here, also, is shown how to check the



NORTH CAROLINA COTTON



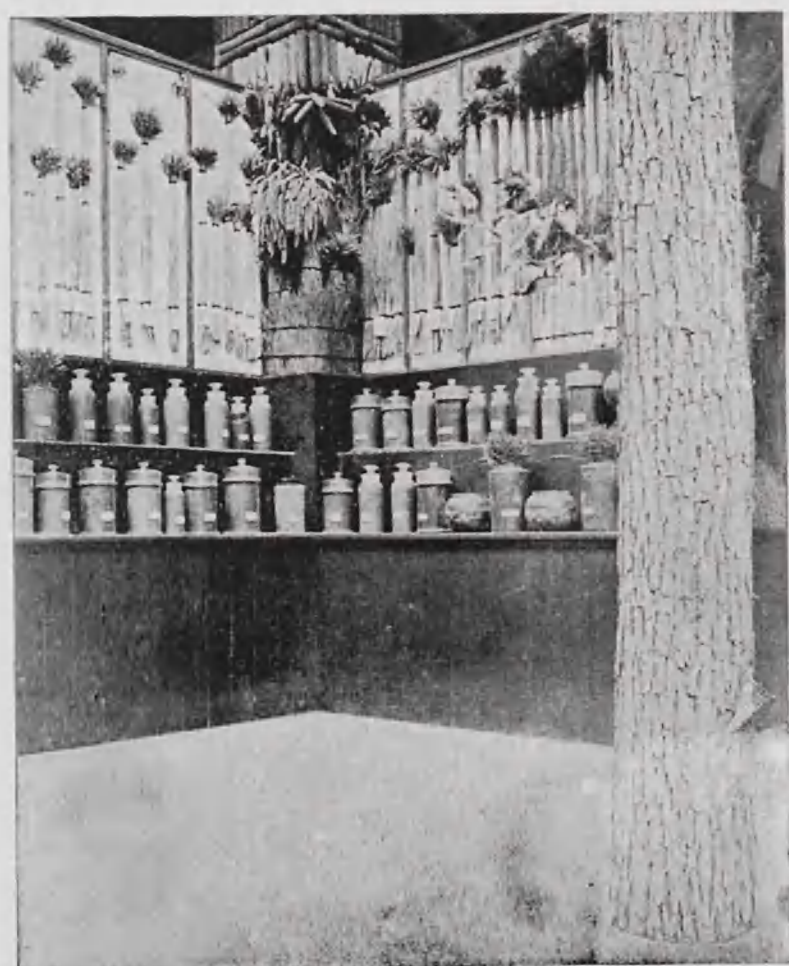
IMPROVED TOBACCO CURING BARN



OKLAHOMA

timothy, oats, rye, barley, flax, and kaffir and broom corn. Considering that this territory is little more than four years old, her display is most creditable, and one that augurs well for her future.

Surrounded by the Pacific coast exhibits is the pavilion of South Dakota, the main entrance of which is in the form of a large triumphal arch, with a doorway on either side. The pillars, arch, doorways, and the supports of the section walls consist of the trunks of trees which were cut in March, 1893, many of them bearing twigs in full leaf. Wheat and



SOUTH DAKOTA GRAINS

grasses comprise the bulk of the exhibit, among the latter being specimens of the switch variety more than thirty feet long. Separated from this section by the California pavilion are those of North Dakota and Kansas, the former containing a profuse display of cereals, both in decorative and exhibitory forms. Above her pavilion is a woman of heroic stature, her right hand resting on a shield, and holding in her left a banner, the entire composition fashioned in grain, as are other elaborate designs. In the Kansas structure, rich in its golden hues, is proclaimed her rank as among the foremost of corn-producing states, the figures above the principal entrance indicating the year of her admission to statehood, and that in which was dedicated the World's Columbian Exposition.



EXHIBIT OF SPICES

in which are specimens of the sugars and syrups for which the state is noted.

Across the passageway from the New Hampshire building is a pavilion bedecked with the brightest of the primary colors, that of

Oklahoma, recently re-christened by its territorial legislature, the Mistletoe state, for this plant is found there in great abundance. As shown by the exhibits, its soil yields wheat, cotton, clover, maize, sorghum,



SOUTH DAKOTA'S PAVILION

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DEVICES IN GRAIN AND GRASS, NORTH DAKOTA



CALIFORNIA GRAINS

almost her entire supply of cereals, and now ranks among the leading sections of the republic in yield and export of wheat. In occasional years California has led all the rest in volume of production, and is among the few whose crop for a single season has exceeded 60,000,000 bushels. Of maize, a few million bushels a year are raised, and of barley, mainly for horse feed and brewing purposes, from 15,000,000 to 20,000,000 bushels, with a moderate export demand.

But cereal farming, and especially wheat farming, is no longer a profitable industry in California, unless conducted on a large scale, and with improved appliances. For this the reasons are not far to seek, with wheat selling, as in recent years, at from 70 to 80 cents a bushel, with labor at \$2 a day in the harvest season, and often

not to be had at that. Then there are excessive freight charges, with delay and difficulty in moving crops, large quantities of wheat remaining unhoused by the side of railroad tracks, where at times it becomes spoiled while awaiting transportation. No wonder that the smaller class of grain-growers cannot compete with those of Russia and Hindostan, where freights are almost nominal, and wages from a fourth to a tenth of California rates. But on the larger farms, some of them with many thousands of acres planted in wheat, the use of steam power in ploughing, planting, and harvesting has so diminished the cost of production, that in favorable locations wheat can be raised and placed at tide-water for less than thirty cents a bushel.

Of hay the California crop is from 1,500,000 to 2,000,000 tons, largely of alfalfa, as there is named the lucerne of the eastern states. With the aid of labor-saving appliances this can be raised at a cost of \$1 a ton, inclusive of cutting, curing, and stacking, while on irrigated lands three or four crops a year, each of as many tons to the acre, are no uncommon yield. Vegetables are largely raised, and especially beans and potatoes, the average yield of the former exceeding 50,000 tons, mainly of the Lima variety, while of the latter and of winter vegetables many thousands of tons are shipped to eastern markets. Of sugar-beets the product is from 10,000 to 15,000 tons a year, with three beet-sugar mills in operation, one of them the largest in the United States. All these and other industries are represented in the Agricultural department, and what has been said in this connection applies in a measure to other sections of the Pacific slope.

In comparison with the display in her state pavilion, the one contained in the Agricultural building is almost insignificant. And yet there are in this collection more than 70 exhibits of cereal crops,



CALIFORNIA CEREALS

with 50 or more of beans, potatoes, and other vegetables, and several each of hay, grasses, and grain in the straw, and of olive oils, while of silk cocoons, and cotton on the stalk there are also single exhibits. Though not an imposing display, all the leading agricultural districts of the state, and nearly all their products, are represented in these California groups, and among them are the usual specimens of phenomenal growth, including melons, pumpkins, and beets, with potatoes one of which would almost suffice for a family dinner.

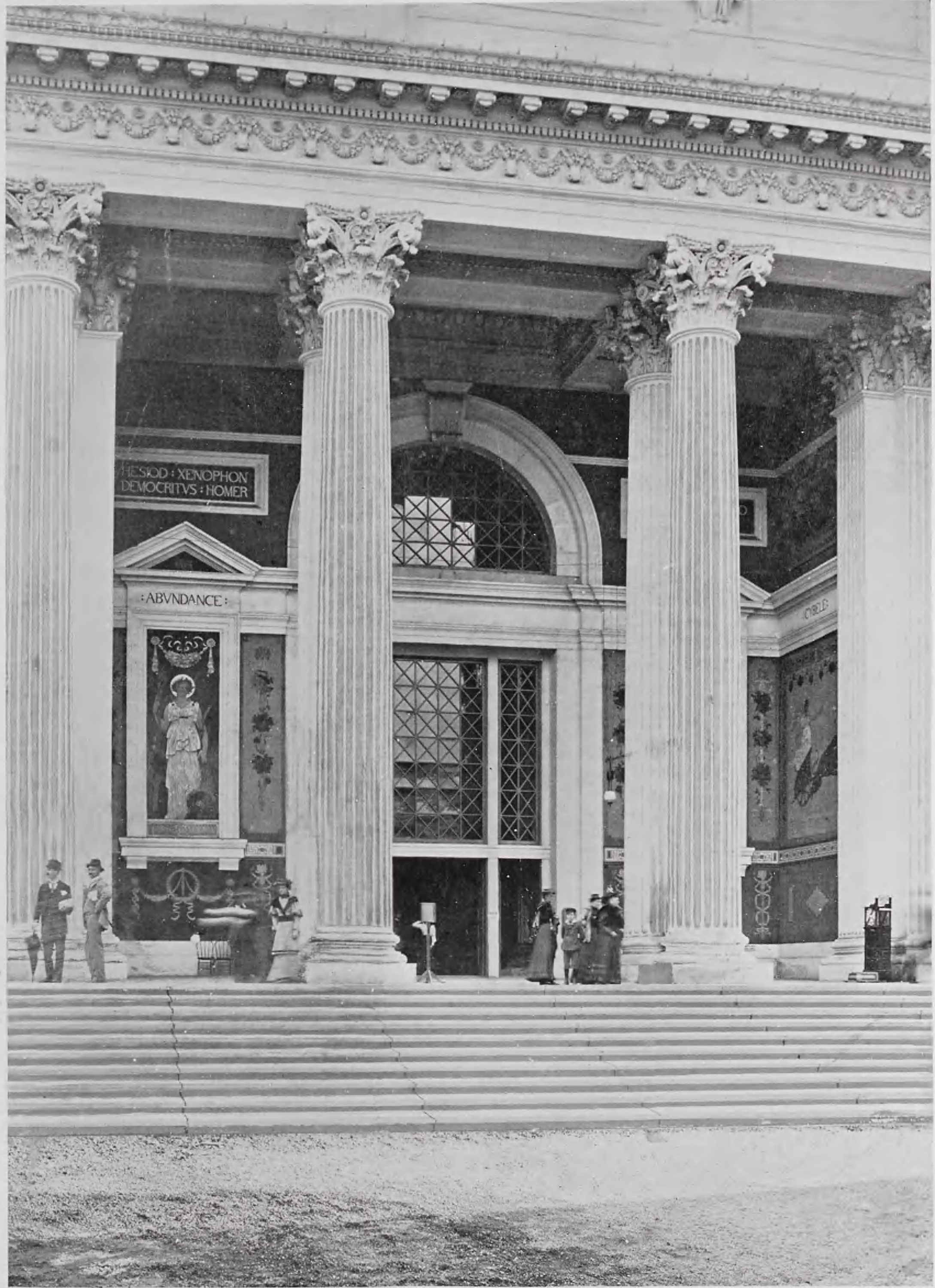
The booth itself is a plain unpretentious structure of glass and wood-work painted in light colors, and with little attempt at ornamentation.



CALIFORNIA WHEAT



CALIFORNIA CORN



NORTH ENTRANCE TO AGRICULTURAL BUILDING

In the centre is a wigwam of unique design, constructed of Indian corn, and elsewhere are bouquets deftly fashioned of native grasses. The exhibits are neatly arranged, and show to the best advantage their several classified groups. But in other departments of the Fair, especially in the Mining and Horticultural sections, and above all in her own home among the state pavilions, California is seen to better advantage. Her display of fruit, for instance, is by far the best on exposition, representing one of her largest and most progressive



NEVADA'S EXHIBIT

industries, one that with cheaper freights is capable of almost unlimited expansion; for to the consumption of fruit in crowded eastern centres there are no practical bounds, if it can be hauled to market at rates that will leave a fair profit to the producer, while placing it within reach of the great army of wage-earners. All this will come in time; and as the golden age of pastoral days was succeeded by the age of gold, as mining gave place to agriculture and stock-raising, so are these latter yielding the precedence to fruit-growing, which promises ere long to lead all other industries, as even to-day it does in the southern portion of the state.

Next to California, Oregon ranks first among the wheat producing sections of the Pacific coast; for ever since the days when were sown on methodist mission lands the first wheat planted in the Pacific Northwest, grain growing has there been a favorite pursuit. In her pavilion, which for reasons best known to the management was sandwiched between those of the southern and middle states, is a large collection of cereals, vegetables, grasses, and forage plants, fairly representing this stable and industrious community, one of the most steadily prosperous in the United States.

Of similar character are the exhibits from Washington, whose production of wheat has increased nearly four-fold during the decade ending with 1892, while for the same period Oregon shows but a slender gain, and California a decrease in yield. Of sheaf grain there are countless specimens, including cereals of all descriptions, and of threshed grain there are many varieties in display and decorative forms. Among them is wheat that has yielded nearly 100 bushels to the acre, and oats that have produced even more abundantly, with timothy hay nearly nine feet high, with vegetables of wonderful size, a complete assortment of field

and garden seeds, and flax in all its stages of growth. Farm buildings and incidents are reproduced in photographic illustrations, and there is a chart containing farm and crop statistics, while climatic conditions are represented as taken from government reports. Few of the Pacific or other states have displayed such interest in the Fair as this, one of the youngest of the sisterhood, two of her citizens taking on themselves the task of preparing an exhaustive exhibit from the counties in which they resided, while a third erected at his own expense, and stocked with grains and fruits, a pavilion in the Washington section.

Nevada, it need hardly be said, is not an agricultural region, though gaining steadily in this as in other branches of industry, now that she has fairly recovered from the depression caused by the faded glories of the Comstock. Except on irrigated lands, cereals can only be raised to advantage in a few locations, as in portions of Elko county, where 30 bushels of wheat to the acre or 50 of barley are no uncommon yield. The exhibits consists mainly of grains and grasses, arranged in frames, and housed in a neat and tasteful pavilion.

Utah's exhibit is well worthy of the community which, during its exodus from Nauvoo, halted midway on its journey to plant and gather grain, near the spot where now stand the cities of Council Bluffs and Omaha. Nowhere in the United States, and probably nowhere in the world have irrigation systems been developed with more economic method or with better results. When in 1846 the Mormons entered their western Zion, their land of Deseret, the first task to which they applied themselves was the construction of irrigating ditches. Twenty years later, when elsewhere on the Pacific coast artificial watering was almost unknown, nearly 300 canals had been built, with a total length of more than 1,000 miles, and conveying the mountain streams and melted snow to 170,000 acres. By 1892 the various systems had been so enlarged as to absorb nearly all the available water, the supply of which formed the only limit to further enterprises. Thus it is that several million bushels a year of cereals are raised on the arid soil of Utah, almost entirely by Mormon farmers; for the saints are essentially a farming community, leaving to their gentile friends the control of commerce and mining.



BOTTLED BEER FROM DENVER

On a sign attached to the Utah pavilion, which lies west of the Washington section, it is announced that everything contained therein was produced by irrigation. A large relief map represents the Malade valley system, with the waters of the Bear river canal and its branches, giving fertility to 150,000 acres of land. In the centre of the booth is the national flag, fashioned of lambs' wool blanketings. A pile of salt made from the waters of the great lake is walled in with bags of salt ready for use or export, and in a series of photographs are shown the natural gas wells in the neighborhood of Salt Lake City. Here also are displayed the nutritious grasses of the territory, with samples of its soil, and its clear unfiltered river water, while of cereals there are many samples, with a few of vegetables and vegetable seeds.

South of the Utah section are the exhibits of Idaho and Colorado, the former including the usual cereal collection, with some remarkable samples, as corn-stalks more than twice the height of a man, and on which are several cobs. In addition to grasses and hay, with vegetables and seeds, of many descriptions, there are specimens such as in former years it was declared impossible to grow on Idaho soil, among them leaf tobacco, flax, and Swedish turnips; but in truth there are few agricultural products that cannot here be raised on irrigated lands.

In the Colorado section is sufficient evidence that she is no longer, as some imagine, merely a mining and stock-raising region. Except for California, her area of land under artificial watering is larger than in any of the Rocky Mountain or the Pacific states, more than 2,000 ditches and canals, with several hundred reservoirs, giving fertility to 3,000,000 or



POULTRY EXHIBIT

4,000,000
acres of land.

Thus it is that instead of importing as in earlier days the bulk of her food supply, Colorado raises from 15,000,000 to 20,000,000 bushels a year of cereals, with

80,000 to 100,000 tons of hay, and of vegetables and dairy products more than suffices for home consumption.

On the frieze of the pavilion are depicted scenes representing the agricultural development of Colorado, and within, her irrigation system finds expression in a model of one of her irrigated valleys. In this structure no wood-work is visible, the entablature resting on arches covered with native grasses, and these on columns wrapped with grain. Among these groups is every variety of grain, threshed and in the sheaf, including some 400 specimens of wheat, 100 of oats, and 70 of barley and rye. There are samples of wheat which has yielded more than 50 bushels; of oats that have produced 130; and of barley, 80 bushels to the acre; but these are of course exceptional returns. In the centre of the display are shown the comparative quantities of grain raised on Colorado soil between 1874 and 1892. Of buckwheat, millet, and broom and Egyptian corn, there are a few samples; of flax a special group; and from Kiowa county, sorghum and sugar-cane.

Of native grasses and forage plants there are more than 100 varieties, a much larger number than was displayed at the Denver exposition of 1884. These are contained in the exhibits of the Colorado Agricultural college and the state commission, and show to excellent advantage the rich pastoral resources of the silver state. Among them are the grama and bunch and buffalo grasses which form the mainstay of sheep and cattle ranges. The cultivated species include sheaves of alfalfa, four to six feet high, bunches of clover two feet in height, and timothy hay with heads two inches long. Finally there is a collection of all the field and garden seeds of economic value.

Wyoming and New Mexico occupy small spaces in Agricultural hall, the former to the east, and the latter to the south of the California section. In both, the production of cereals and fruits is rapidly gaining ground under the stimulus of irrigation, and especially in Wyoming, this, the youngest of all the states, now ranking third in area of irrigated land, and second in mileage of irrigating canals. Her exhibit includes grains arranged in glass tubes, with native and cultivated grasses, hay, and vegetables, all produced, as is stated, by artificial watering. The New Mexican group consists entirely of grains, and especially wheat, of which there are nearly 500 samples.

West of the New Mexican section is Montana's handsome pavilion, one of the most tasteful structures in Agricultural hall, and containing in its 200 or more exhibits an exhaustive representation of her products and

resources. Within is a pagoda fashioned of native grasses, and on a semicircular screen are presented the agricultural records of the state. As in other groups, cereals form the bulk of the specimens; but vegetables are also in good supply, with feed and fodder of many varieties, as blue-joint, blue-stem, bunch, and other grasses, clover of several descriptions, alfalfa, timothy, and red-top hay, and whatsoever else of grasses and hays is grown on Montana soil, its native herbage constituting a primary source of wealth. Though Montana is not an agricultural region, there are many sections well adapted to grain and other farming, with an average crop for 1892 of 33 bushels of wheat to the acre, 35 of barley, and 40 of oats, while on irrigated lands the average for all grain crops is nearly 42 bushels, and of vegetables 2.40 to the acre. Already there are some 250,000 acres of irrigated land in actual cultivation, and with the high prices of farm products, far above those of most of the Pacific states, Montana must cease to import, as now she does, a large proportion of her food supply.

Such are the agricultural products and resources of the Pacific slope, as represented at the Columbian Exposition, and here described somewhat at length as compared with other sections of the republic. As to the latter, most of my readers are doubtless well informed; but to many will be almost in the nature of a revelation. In 1850 the cereal crop of the entire western coast could have been placed on board a single sea-going ship; in 1892 several hundred grain-laden vessels carried her surplus wheat



CHEMICAL LABORATORY

and flour to a score of foreign ports. Yet in this region, covering nearly one-third of the total area of the United States, there is infinite room for further development.

In the south-western corner of Agricultural hall is the collective exhibit of agricultural colleges and experiment stations connected with or under the supervision of the government. Grouped along the outer walls of this section are specimens of plant life, models illustrating the development of the plough, articles contributed by women associated with the domestic and industrial departments, and various instruments used in ascertaining the properties of soil. Within are exhibits from manual training schools, and apparatus contributed by the laboratories. In the latter are ascertained many valuable facts relating to insects and parasites injurious to grains, fruits, and live-stock, with other matters



ENGLISH CHEESE AND HAMS

that concern the agriculturist. Beyond are exhibits of grains and vegetables from various stations, some blighted, and others in a healthy condition.

One of the most practical results of the experiments conducted by this branch of the agricultural department, is that which shows the effect of feeding to live-stock different proportions of food elements. In a series of glass boxes are various grains, with layers of protein, carbohydrates, and fats, and beneath them are stated the several quantities required to produce ten pounds of additional weight in cattle, sheep, and swine. Experiments have also been made to ascertain what results would follow as to the production of fat or flesh, and beneath the vessels which show the proportion of food elements that entered into these constituents are represented sections of their bodies, with the distribution of fat and lean.

All the states have contributed to this collective exhibit, the Massachusetts college showing a collection of soils taken from different sections, accompanied by statements regarding chemical and mechanical analyses. The veterinary department of this college sends a model of a horse displaying its anatomy, and among the exhibits of the entomological section is the gypsy moth, with a story of its life, habits, and devastations. Plaster of paris specimens of Indian corn, parsnips, carrots, apples, pears, and potatoes occupy another case, samples being shown both of cultivated and wild varieties. In addition to these are charts with 3,000 figures, illustrating the systematic study of botany, and some ingenious apparatus for ascertaining the



BOVRIL BEEF EXHIBIT

pressure exerted by the flow of sap through trees. Near the exhibits of experiment stations is a large array of mounted Indian fowls, contributed by the New York branch, and illustrating various methods of feeding and of treatment.

The entire display is neatly and systematically arranged, glass-covered cabinets, cases, and jars containing, not only farm products, but every form of life that pertains to farming in all its phases, including the care and breeding of live-stock. Here also is illustrated the botany of the farm, showing the seeds and plants best adapted to various locations, and when and where to place them, with many varieties of vegetables serving as food for man or beast. In the entomological section are cases of many-hued insects, some of them harmless, and others destructive to crops. Finally, it may be said that in this collective exhibit, almost hidden from view by the surrounding pavilions, is one of the most attractive features of the Agricultural department, one in which the colleges have given emphasis to the government display. The object of the former is to afford a scientific training, both practical and theoretical, in connection with the varied industries of the farm, to train their pupils in the elements of art, and to make of them useful citizens, whose hands are the ready instruments of thoughtful and cultured minds.

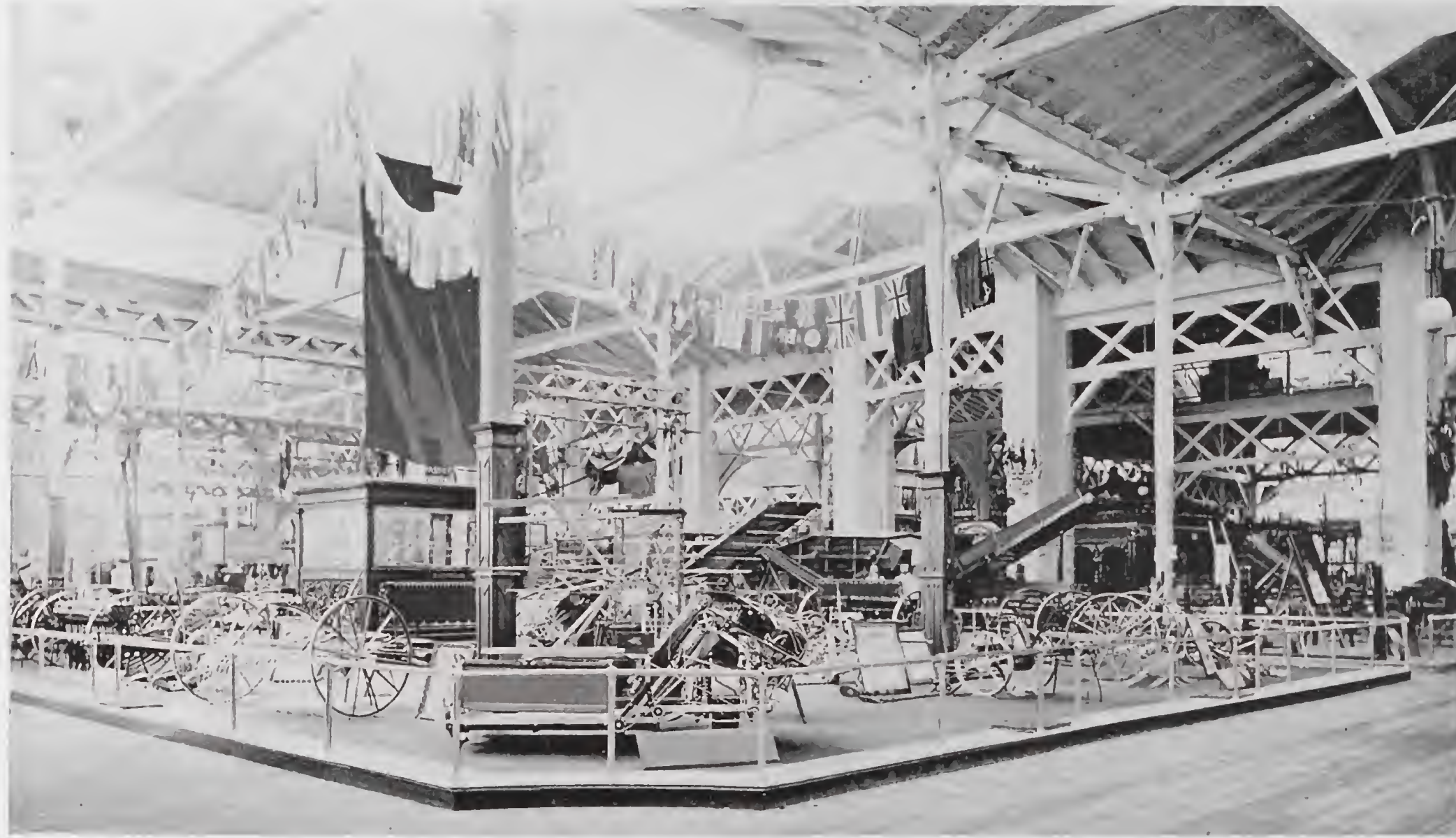


A GALLERY PAVILION

In cereal and other raw products Great Britain is somewhat feebly represented in her 12,000 feet of space in the Agricultural building, her exhibits comparing unfavorably with those of Canada, which ships to the mother country a large proportion of her wheat surplus. In England the acreage planted in grain, and especially in wheat, is steadily diminishing, the decrease in the latter exceeding 25 per cent for the decade ending with 1892. For that year the entire area in wheat was only 2,300,000 acres, or less than was planted in the single state of Indiana. In many of the American states the acreage and yield in cereals is larger than in the British isles, where little more than 9,000,000 acres are actually under cultivation, but with a larger proportionate surface devoted to hay and root crops. In average returns, however, the comparison is largely in favor of the latter, where of wheat the normal yield is 30 bushels, of barley 33, and of oats 40 bushels to the acre. These results are due largely to the more thorough and systematic farming, rendered necessary by the smaller size of holdings, which for the United Kingdom averages less than 50 acres, only a few hundred among the 1,500,000 landlords and farm-

ers owning or renting more than 1,000 acres. Other causes are the rotation of crops, the fallowing of land for two or three years in succession, and the general use of fertilizers, of which more than 1,000,000 tons, nearly half of it imported at an annual cost of \$6,000,000 or \$7,000,000, aid in maintaining the fertility of the soil.

But with all his care and economy, the British grain-grower finds it no easy task to earn for himself a livelihood, so that many are turning their attention to root crops as yielding better returns, when taken in connection with stock-raising. In addition to hay, mangel-wurzel, turnips, and even cabbages are raised for winter feed, these being protected from frost, and mixed with dry fodder when distributed among the cattle sheds. Dairy farming is another prominent industry, and especially cheese-making, Stilton, Cheshire, and other



CANADIAN EXHIBIT

favorite kinds always holding their own in the market. Nevertheless Great Britain imports from Holland and elsewhere cheese to the annual value of \$30,000,000, butter and margarine that cost her nearly thrice that sum, while of the total consumption of milk, and that which is made of milk, requiring nearly 3,000,000,000 gallons a year, little more than one-half is produced at home. Hop-raising is a favorite, and in good seasons a profitable pursuit, especially in the southern counties, the yield for 1892 exceeding 46,000,000 pounds; for the British are a beer-drinking people, consuming more than 30 gallons a year per capita of population. Add to this market-gardening and fruit-growing, both showing a steady gain in acreage and production, and it will be seen that there are branches of remunerative farming still open to the British husbandman.

But while the outlook is not so dark as some would have us believe, it is nevertheless sufficiently gloomy; nor are the causes far to seek for this condition of affairs. First and chiefest among them are low prices, especially for grain, caused by over-production in the United States and India; these, with free trade, excessive taxation, complicated land laws, and the heavy toll demanded by railroads and middlemen, laying on the farmer a burden greater than he can bear. Thus it is that rents have gradually been reduced from twenty to fifty per cent, and in some localities, especially in Ireland, have almost reached the vanishing point, while there are large agricultural areas whose value has sunk to a level with that of the prairie lands of Iowa and Illinois. Though many remedies have been suggested, such as protection, bi-metallism, and the creation of peasant holdings, it is doubtful whether any or all of them would go far to mitigate an evil due almost entirely to low prices, one that can only be righted by increased consumption or diminished production.

From the agricultural experiment grounds of a Lancashire exhibitor are displayed samples of ears and grain, as the result of operations, extending over thirteen years, for improving, by careful selection and fertilization,

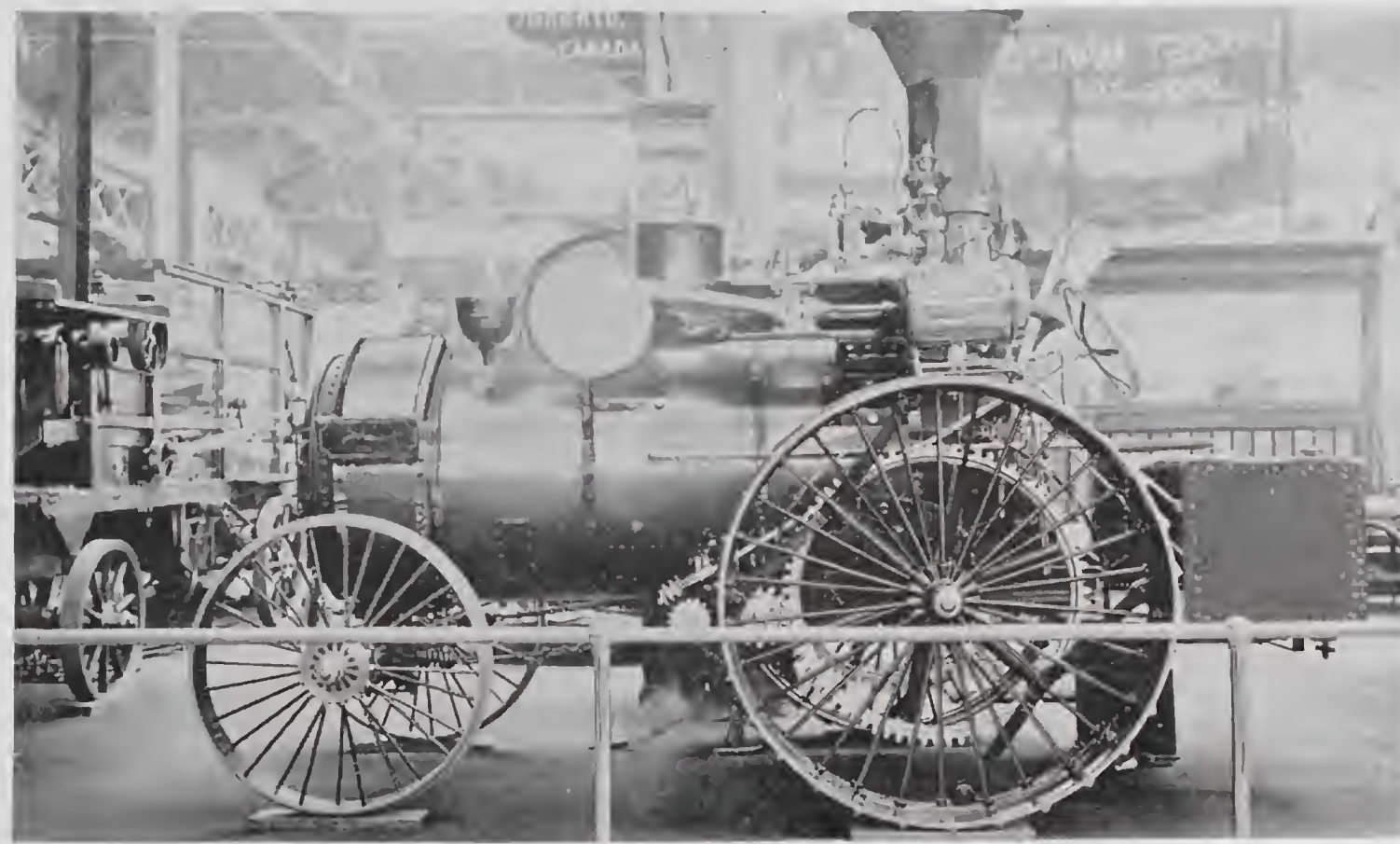
the cereals of all the principal grain-growing countries in the world. Add to these a few specimens of wheat and oats from a Kentish farmer, one of them showing 76 ears, and some 4,500 grains as the product of a single kernel, and apart from a couple of oatmeal exhibits from Drogheda, Ireland, we include about all that England has to show us in the way of cereals. Dairy products are represented



HAPPY FAMILY, CANADA



CANADIAN GRAIN



TRACTION ENGINE, CANADA

Food preparations are better represented, as also are mineral waters, temperance beverages, and malt and spirituous liquors. From the British Bee-keepers' association comes an exhibit of 1,000 pounds of extracted honey, contributed by 100 apiarists, with books, pamphlets, and diagrams used by the society's lecturers and experts. By a coöperative organization are displayed samples of English, Scotch, and Irish honeys, with beeswax in various forms. In the same group is an exhibit of Queensland cane sugar, now largely produced in that country by Kanaka labor. Of tea, coffee, cocoa, and chocolate there are many varieties, and among the first is one from the Sylhet tea gardens in London, showing the plant in every stage of growth, as raised in that district of the Indian province of Assam. Preserved meats, soups, fish, fruits, and vegetables are in liberal supply, with combinations and concentrations for which special virtues are claimed, as those of the Bovril company, prepared from essences of beef, its exhibits housed in the most picturesque of booths, with office representing a fortress enthroned on a steep and rugged cliff. Of mineral waters there is a large array, and with them are many other drinks for the total abstainer, including such non-alcoholic preparations as hop bitters, fruit cordials, and orange champagne.

Except for a few samples of London gin and compounded spirits, whatever these latter may be, the samples of alcoholic liquors are limited to Scotch and Irish whiskeys, the former including the finest of Highland brands, and the latter the famous poteen which, in its purity, is one of the best of whiskeys, though for every gallon of the real article a hundred are sold under its name. Among these exhibits is a round tower, forty feet high, and constructed entirely of whiskeys in wood and bottle from a Dublin distillery. Allsopp's, Tennent's, and other favorite varieties of ale, porter, and stout are classed in a separate group. Of tobacco, an interesting display is that of the British North Borneo company, including leaf for wrappers, and cigars made entirely or in part from the products of its plantations. A similar exhibit is that of a company whose estates are in Sumatra, and a Birmingham company shows its appliances for rolling the leaf into coils or plugs, and for the making of cigarettes.

But the most attractive exhibit in the British section is a model of the Brookfield stud farm, at the foot of the Highgate hills, within a few miles of the most densely thronged of London's business centres. The stud is the property of W. Burdett-Coutts, whose "unearned increment" of wealth, with the influence that wealth commands, won him a seat as member of parliament for Westminster. Its purpose is to preserve and improve the old English breeds of coach-horses, hackneys, cobs, and ponies, some of which were in danger of becoming extinct. In the model are reproduced with remarkable fidelity of detail, all portions of the farm and stud, from the cottage of the groom, and the office where clerical work is done, to the covered yard, the clean well ventilated stables and loose boxes, the harness room, the riding-school, the granary and barn, and the show-ground with its wide expanse of turf.

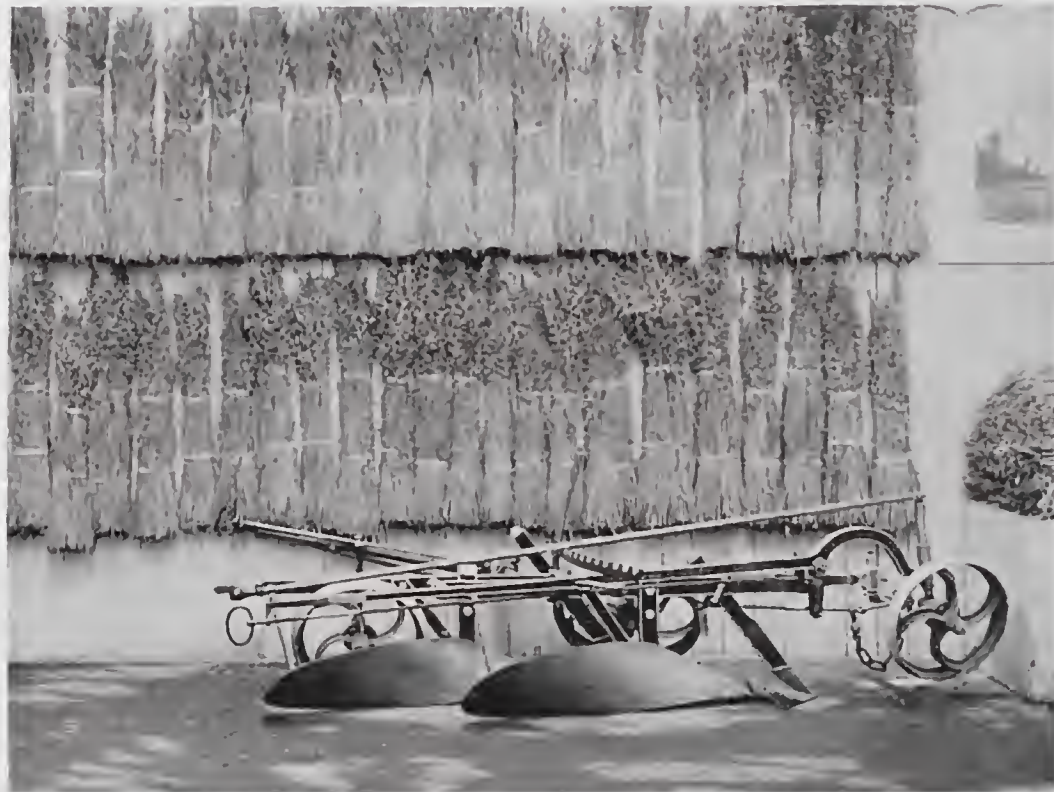
by a single exhibit, and dairy appliances by a collection of churns, and other apparatus, the latter from the London and Provincial Dairy company. Of animal and vegetable fibres there is also but one collection, and that from an Irish company whose headquarters are at Belfast. Among fertilizers and fertilizing compounds are included nearly all the varieties used in Great Britain, as guano, ground bones, phosphates, sulphates, and other chemical preparations. Near them is an exhibit of eucalyptus oils and eucalyptus soap, the former in a dozen varieties as manufactured from various species of the gum-tree by a company whose works are in the Australian colony of Queensland.



THE LARGEST CHEESE IN THE WORLD

There is also a collection of oil paintings by prominent artists, including those of the sire of Brookfield, and other famous hackneys.

East of the British section are the more compact exhibits of Canada, contained in three pavilions, one of them displaying the cereal, root, and other products of the government's experimental farm at Ottawa. There are also minor pavilions erected by the officials of the agricultural colleges of Ontario and Quebec, the latter structure in two portions, made of tobacco and grain. Near the enclosure which surrounds the government pavilions is a heterogeneous collection of articles, among them flour, starch, maple syrup, mineral waters, malt extracts, beers, and ales. Of cheeses, the making of which is a prominent Canadian industry, there is a sufficient display, and one of the chief attractions in this section is a monster cheese, encased in an iron tank, and mounted on a platform approached by a flight of stairs. On an inscription attached to the stand we are informed that it weighs 22,000 pounds, and that to supply the materials more than 1,600 maids milked 27,000 gallons from 10,000 cows. Manitoba, British Columbia, and the northwest provinces are all represented in the Canadian division, where are also mounted specimens of the white and black bear, of deer, goats, antelope, wild geese, and turkeys, with other illustrations of Canadian fauna.



NEW SOUTH WALES CEREALS

In the annex is a collection of Canadian agricultural machinery, and as neither Great Britain nor any other of her dependencies have any exhibits of the kind, it represents the contribution of the entire empire in this department. The largest display is from a Toronto company, and includes binders, threshers, cultivators, mowers, and a Manitoba straw-burning engine. The last is used by agriculturists in regions where wood is scarce, and is fitted with a tubular boiler of peculiar construction, whereby a forced draft may be obtained. The cog-wheels are of aluminum, and connected with the thresher, which is supplied with an ingenious device for measuring the amount of grain that passes through it. The company's office is panelled with fifteen varieties of Canadian woods, such as are used in the construction of its machines, and included in its collection are the medals awarded at former expositions. In all some thirty firms have samples of agricultural implements, and among them are a few special apparatus, as pea harvesters and sap evaporators; but as for the most part one agricultural machine is very like another, when used for similar purposes, it is unnecessary here to describe them in detail.

A feature in the Agricultural building, and one that has never been seen before, except at such local expositions as were held in Sydney and Melbourne, is an exhibit of the agricultural products of the Australian colonies, and especially from the oldest of her colonies, that of New South Wales. It is now some three centuries since a French navigator, landing on the western shore of the continent, found there, as he relates, a boundless expanse of forest primeval, with no signs of life nor anything that would support it, save for a few human and marsupial bipeds, the former so degraded that he hesitated whether or not to class them among the brute creation. But on this continent, with an area about equal to that of the United States, there is now a larger white population than on the entire



ENTRANCE, NEW SOUTH WALES PAVILION



CANNED GOODS, NEW SOUTH WALES



GRASSES AND FAT TAIL SHEEP, CAPE COLONY

Pacific coast, a contented and in the main a prosperous community, one that has built at least two cities larger than the Pacific coast metropolis, with many of smaller size. Among its sheep-farmers and stock-raisers are not a few who count their herds by tens of thousands, and their flocks by hundreds of thousands, the wool-clip of a single station, as the Australian terms his rancho, sufficing to load a clipper ship.

While not an agricultural country, in the proper sense



ANGORA GOAT AND SKINS, CAPE COLONY

of the word, Australia is more than self-supporting, producing of certain staples a much larger surplus for foreign markets than offsets the importation of others. Though wheat thrives badly on its thin, arid soil, an average crop represents a value of \$30,000,000, and yet the average yield does not exceed seven or eight bushels to the acre. Of other cereals the product is worth some \$25,000,000; of hay an equal amount; of root crops \$20,000,000; of vineyards, orchards, and

market gardens, \$22,000,000, and of cane-sugar, \$10,000,000, the last produced only in Queensland and New South Wales. Of wool the clip from 125,000,000 sheep, more than twice the number contained in the United States, was valued in 1892 at nearly \$20,000,000, and of canned and frozen meats there is a considerable and steadily increasing export. In the latter department the colonies are encroaching somewhat on the American trade, for beef and mutton are worth less than half the prices paid for them in the eastern states. Such is the industrial condition of Australia, a country yet in its infancy, with a population of less than two to the square mile, but with resources which, until recent years, were not appreciated even by the Australians themselves.

Notwithstanding a serious depreciation in the price of wool, with little prospect of improvement so long as sheep continue to increase in two-fold ratio as compared with the human race, sheep-farming continues to be, as it ever has been, the greatest of Australian industries. And especially is this true of New South Wales, whose exports of wool for 1891 amounted to 332,000,000 pounds, valued at \$56,000,000. As to the quality of this wool we have a complete illustration in the exhibits of the Australian section, forming the largest collection of the kind in Agricultural hall. In this collection there are no less than 400 bales, representing many varieties, from the soft merino fleece, prized for its purity and texture, to the coarser grades valued for quantity rather than quality of clip. At the entrance to one of the apartments is an arch constructed of solid bales of wool, and within or abutting on the aisles are pillars and pyramids of similar construction, with bins and cases filled with samples in bulk or fleece. There are also pictures of sheep and sheep stations, and as though standing ready to start on its journey of many hundreds of miles is a heavy wagon, laden with wool, more cumbersome even than the so-called prairie-schooners which bore across plain and mountain of America the argonauts of 1849.

In another apartment are the exhibits of cereals, flour, oils, and such as represent the tanneries and meat-preserving processes of New South Wales. Among them is an arch of corn cobs, artistically fashioned, and representing a prominent branch of colonial industry; for



GOATS AND SHEEP, CAPE COLONY



WINE, CAPE COLONY

gold, and took from us in the same year goods to the value of more than \$6,000,000, while shipping to this country little more than half that quantity of exports. While Australian merchants deal more largely with the United States than with any other foreign nation, their transactions are trifling in comparison with those of Canadian business men, who purchase in American markets nearly one-half of all that they require.

Small in size but of excellent quality, complete, compact, and in perfect taste, is the exhibit of Cape Colony, grouped in a glass pannelled enclosure decorated with banners and bannerets, its windows hung with ostrich eggs, and depicting the flora and scenery of southern Africa. On a revolving frame within is a choice collection of water colors, representing in natural size and hue the most beautiful and fragrant flowers and creepers, indigenous and exotic, among them some wonderful orchids and vines. In the decorative scheme is largely used a gray, silvery vine, which so far as is known grows only on Table mountain, near the foot of which lies Cape Town. Flanking the entrance ways are cases filled with ostrich plumes in their various shades of color,



OSTRICH EGGS, CAPE COLONY

maize thrives well on Australian soil, and is the only cereal that is largely raised for export. Here also are dried specimens of native grasses, such as are found on sheep and cattle ranges, with leaf tobacco, sugar-cane, and pyramids of food preparations and table delicacies. On the walls and pillars are large photographic views of public and other buildings in Sydney, and to the arch-ways of wool and corn is appended the Australian coat-of-arms, above it the colonial flag, on the field of which is the constellation of the southern cross.

Except for the exhibit of wool, Victoria, the smallest in size but the foremost of all the Australias in population and enterprise, has nothing worthy of mention, this not through indifference but on account of a severe financial depression, forbidding the appropriation of public funds. The collection of wools is from the Australian Sheep-breeders' association, and includes the choicest samples of the various grades in bale and fleece, with many fine and long wool varieties. In conclusion it may be said that the Australian exhibits, not only of agricultural specimens, but in the mining, fisheries, and other departments, display as they were never before displayed the varied products and the infinite resources and possibilities of the southern continent. Among these exhibits is much that is well worthy of being studied by American merchants and manufacturers, not merely as a matter of curiosity, but with a view to the enlargement of commercial intercourse. While our trade with Australia is of considerable amount, it is insignificant compared with what it should be, and the more so because the balance of trade is largely in favor of this country. New South Wales, for instance, sent us in 1891 more than \$8,000,000 of her



NEW ZEALAND HEMP

from those of grayish-brown, such as cover the back, to the soft, fleecy

feathers, white as the driven snow, that are plucked from the tip of the wing. In the centre of the booth is a gigantic ostrich, and mounted on stands are two full-grown birds in all the glory of their plumage. In one of the cases, side by side with a large pyramid is a select assortment of eggs, some polished and others painted in various designs.

Of other birds the collection is remarkable for variety of species, and brilliancy of plumage. Fish are represented in water colors, their scales displaying all the brilliant hues of semi-tropic climes. In the centre of the booth are mounted specimens of animals, showing the highest art of the taxidermist. Among them is an Angora goat, with its silky coating of hair, a fat-tailed sheep, whose unwieldy appendage is esteemed by Kaffirs a delicacy, and a so-called Boer goat, whose hair and carcase are worthless, and whose mission in life is to guide homeward the flocks at nightfall. Elsewhere are specimens of furs and pelts, with rugs fashioned from the skins of the golden jackal and



GRAIN AND GRASSES, FRENCH EXHIBIT

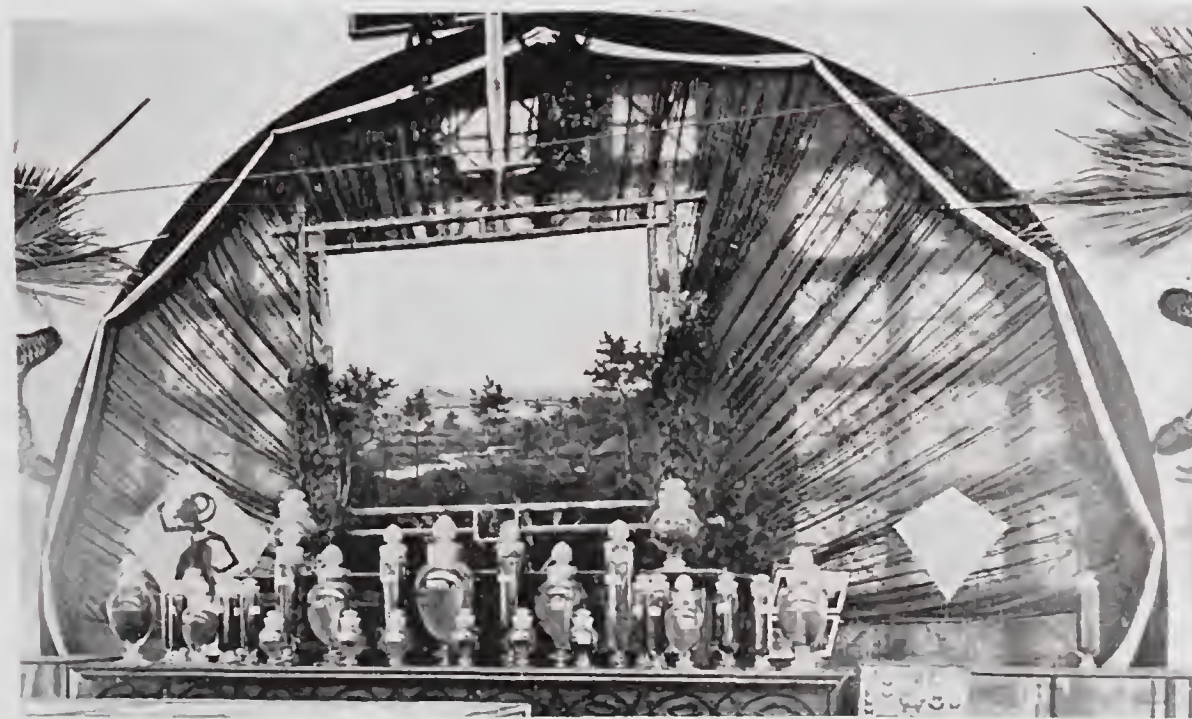
in the form of a pyramid, and side by side with bush or native tea is tobacco, cured and in the leaf. Of cereals there is a small display, but one of superior quality, including samples of wheat that weighs nearly seventy pounds to the bushel. There are also the buchu leaves, used for medicinal purposes, with native grasses, gum-arabic, and dye and other woods of many descriptions.

Of miscellaneous articles there is an interesting assortment, including Kaffir, Zulu, and other weapons, implements, and curios, among them the assegai, thrown by the African bushmen with unerring aim, and which in the Zulu war dealt his death-blow to the prince imperial, son of Napoleon III. There are also the insignia of chieftaincy, including a curious cloak made of strands of twisted fur, such as is worn by a chieftain's wife on state occasions.

North of the Australian section, and adjoining the rotunda of Agricultural hall, is the pavilion of Ceylon, with pillars of ebony and wood-work elaborately carved. Tea forms the principal display, and those who are so inclined may test the quality of the brew, as prepared and served by native attendants. There is a model of a tea plantation, and in diagram form is shown a thirty years' record of Ceylonese exports to Great Britain, where most of the surplus teas are marketed. Other exhibits are native woods; cinchona, or, as it is more commonly termed, Peruvian bark; desiccated cocoa-nut, and the products of cocoa-nut



CORK EXHIBIT, ALGERIA



JAVANESE EXHIBIT

fibre, as in mattings, ropes, and basket-work, these with a few skins, a case of plumbago, an irrigating machine, and a small collection of agricultural implements, including about all that Ceylon has to show us in this department.

In France about one-half of the entire population depends on agriculture for a livelihood, the number of proprietary and tenant farmers amounting to nearly 4,500,000, the majority

the spotted tiger. Of tusks there is a fair collection, including what is said to be the largest elephant's tusk in existence, more than seven feet long, and weighing nearly 160 pounds.

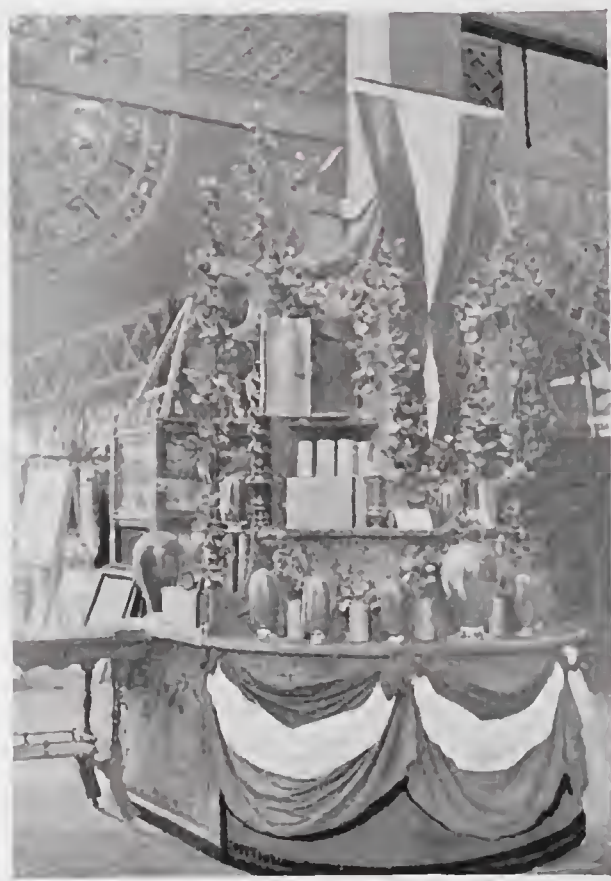
Of wool and mohair there is a plentiful display, the latter selling in the London market at thirty-five cents a pound, and comparing favorably with Turkish and other growths except for length of staple. Though a comparatively recent industry, exports of mohair for 1891 amounted to some 10,000,000 pounds, while those of wool for the same year exceeded 75,000,000 pounds. Cape wines and brandies are arranged



GERMAN SECTION

effort, the \$200,000,000 of her war indemnity, to sink nearly twice that amount in the Panama canal project, and pay as interest and sinking fund some \$260,000,000 on her \$6,500,000,000 of national debt.

France and her colonies occupy sections in the annex, and the western and eastern portions of the main building, the exhibit of the government being installed between that of Russia and the United States. This consists largely of maps and charts, showing the location of vineyards, agricultural districts, and national schools of agriculture, with such statistical tables as represent the fluctuations in the prices of bread and breadstuffs throughout the republic from 1830 to 1891, and of meats and all agricultural products during the seventeenth and eighteenth centuries. The results of various experiments in the government laboratories are also given, and there is a model of the testing field, connected with the government seed house, with photographs illustrating the province of the French agricultural department, especially in sugar-beet culture, as conducted at the government farm at Grignon. In addition to these are models and programmes of the primary agricultural schools, with their methods of education fully explained.

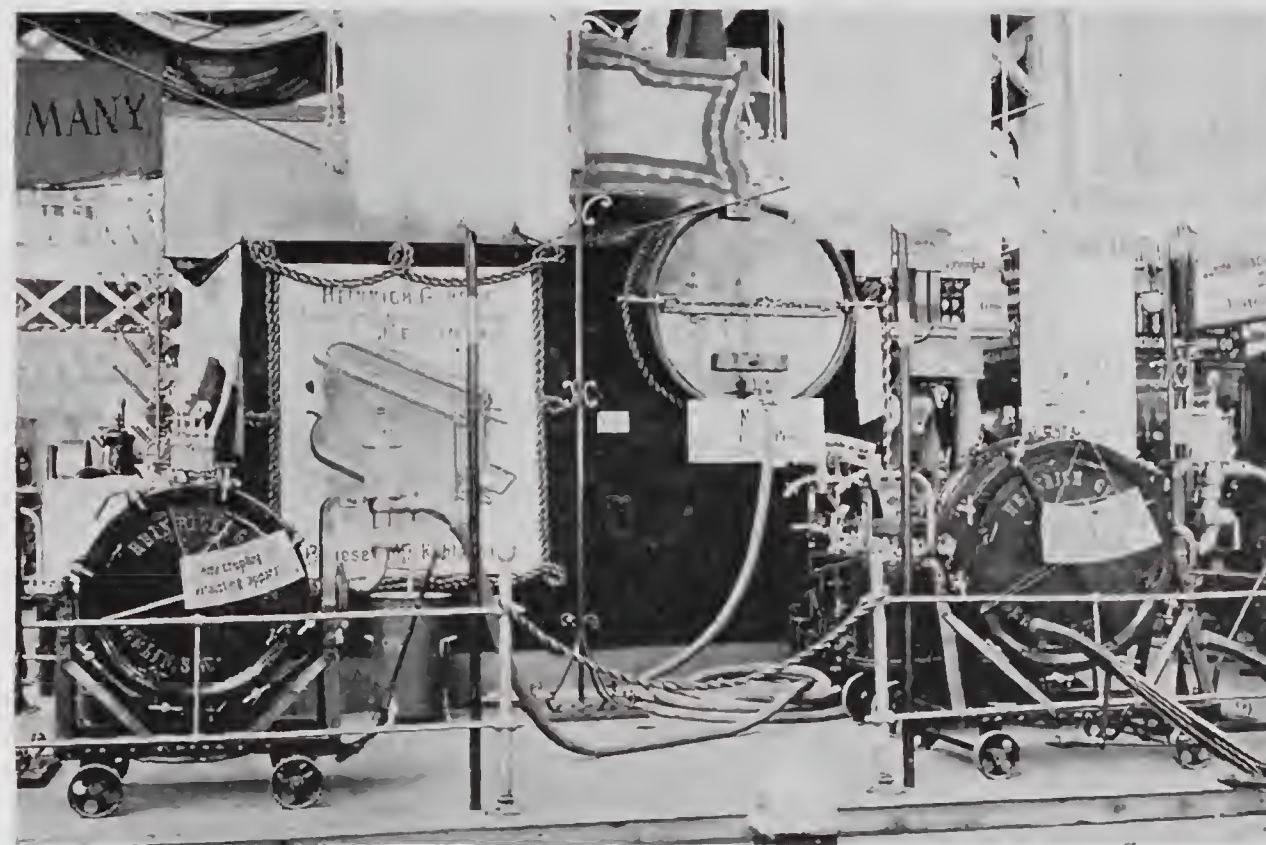


BREWING PROCESS, GERMANY

Fronting on the eastern extremity of the central transverse nave are displayed the products of French farms, including food preparations. Grains and vegetables are arranged along the walls, with seeds and colored illustrations in the centre. Elsewhere are barrels of flour, glass cases filled with refined sugars, canned vegetables, fruits, and nuts, salad oils, liqueurs, and delicacies in solid and liquid form.

In the French pavilion the main attraction is a rectangular structure, about thirty feet long, and half that width and height, with an arched door-way in the centre composed entirely of small papers of chocolate manufactured by a Parisian house, and representing the daily output of 50 tons, valued at \$40,000. In the

belonging to the former class, with about an equal number of laborers and domestics. Add to these the wives and families of agriculturists, many of whom share in the work of the farm, and we have a total of some 19,000,000 persons supported by this industry. Partly through the agency of the law which requires the father to bequeath his property in equal shares among his children, the subdivision of farms has here been carried to an extreme. Nevertheless France still imports largely of cereals, the total of her average crop not exceeding 40,000,000 bushels a year. Nowhere are better understood the advantages of diversity of farming, and nowhere are the agricultural classes more frugal and industrious. Largely through their contributions France has been enabled to pay almost without apparent



GERMAN BEER FILTERING APPARATUS



APOLLINARIS WATER, GERMANY



GRAND BASIN AND COURT OF HONOR



RUSSIAN GRAIN EXHIBIT

annex is a display of distillery apparatus, and a large portion of the space is occupied by a model barn, with granaries, stalls for live-stock, and other farm buildings enclosing a central yard.

In an adjacent section to the north of the pavilion the French colony of Algeria displays her products, the main exhibit consisting of cork in many varieties. The principal entrance to the Algerian edifice is framed with slabs of cork; within is the tree itself, and there are many carvings of superior design and execution. The rough bark is exhibited in bales, and sheets of cork are shown for use in the linings of hats, and the insoles of shoes. The entire collection represents an industry which is making rapid headway, if we can believe the statement here contained, that in this colony more than a million acres are covered with young cork-trees, not yet in bearing.

Cordage is also a leading Algerian product, many of the specimens here displayed being made from the native grass known as alfa. A mass of silk cocoons attached to the branches of a mulberry tree points to another prominent industry, as also the cases in this vicinity containing such products as olive oils, nuts, dried figs, grains, and cigarettes. Across the aisle from the main section is a tasteful structure containing a central court cooled by a beautiful fountain, its enclosing arches and floor in imitation of marble, and its walls hung with Moorish tapestries. This is a reproduction of an apartment in the

palace of the Algerian governor, and adjoining it is the office of the colonial commissioner, with collections of native woods bound in the shape of volumes, a carved and inlaid cabinet, specimens of needle-work, tobacco, and minerals, and typical illustrations by native artists.

In Germany more than one-third of her 50,000,000 inhabitants are supported by agriculture, the total number exceeding 19,000,000, of whom nearly one-half are actual farmers or farm laborers. About fifty per cent of the entire area of the German empire is classed as arable lands, of which there are 65,000,000 acres, a goodly surface in truth, but less than is contained in a couple of our western states. As in France, agricultural lands are here minutely subdivided, with 2,500,000 farms of less than two and a half acres, and perhaps an equal number below 25 acres, while of those above 250 acres there are less than 25,000. Even the smallest of these holdings include a certain percentage of meadow and cultivated pasture lands; yet each of them suffices for the support of a family. But with his careful and laborious husbandry, the German turns his land to the best account, raising of wheat an average crop of nearly 50 bushels an acre, with other cereals in proportion, while of potatoes the yield is five times as large, far surpassing that of Ireland, the "land of potatoes and poteen." In Austria and Hungary considerably more than one-half the population is maintained directly or indirectly by agricultural pursuits, which, especially in the latter country, are rewarded by excellent returns.



WOOL IN THE GREASE, RUSSIA



THE DANISH PAVILION

The German and Austrian groups, the former by far the more interesting and extensive, are separated from the British section by the main longitudinal nave. In the latter the most noticeable feature is that which represents the mineral waters of Austria, an exhibitor from the neighborhood of Carlsbad displaying a huge metallic bottle at whose base is a number of the vessels used in the trade. Hops, barley, and seeds, wax and waxen goods, are also on exposition, with powders for the destruction of insects, and appliances and publications relating to the several industries of the apiarist.

In the German section, are two main centres of interest, ranking indeed among the most attractive features in Agricultural hall. The first of these is the pavilion of the Stollwerck brothers of Cologne, fashioned of chocolate and



PORTO RICO EXHIBIT

lective exhibit of their waters in a pavilion adorned with statuary, and provided with settees and easy chairs for invalids, and others seeking information. Baden-Baden, through its city committee on baths, presents views of that well known resort, with plans of its new bathing establishment. The royal Prussian bath at Ems, the cold and the hot sea water baths of Heligoland, the royal Bavarian baths, and the Harzburg Springs company, purveyors to the dukes of Edinburg and Saxe-Coburg-Gotha, with other noted sanatoria are also represented. In the northwestern portion of the annex are the exhibits of machinery for the treatment of mineral waters, with refrigerators and the apparatus used in breweries and distilleries. Such agricultural appliances as ploughs, scythes, potato-harvesters, and threshing machines, with fertilizers of various descriptions are also on exposition.



MEXICAN TOBACCO AND LIQUORS

in the form of a temple of the renaissance period. It is 38 feet in height, and in its construction were used 30,000 pounds of chocolate and cocoa butter, the latter giving to the structure the semblance of marble. Blocks of chocolate form the foundation, upon which rest fluted columns crowned, above the architrave, by the emblematic eagles of Germany, and surmounted by a dome, with the imperial crown as apex. In the midst of the temple is a heroic statue of Germania, modelled after the figure on the Niederwald monument, and sculptured from a solid mass of chocolate. On its pedestal are reliefs, more than life size, of the emperors William I, Frederick III, William II, Bismarck, Von Moltke, and other historic characters.

The other exhibit to which reference is made is also in the shape of a temple, its court containing an exposition of the industries which centre in a Strassfurt establishment for the mining of salt and potash deposits, and their manufacture into fertilizers. This is known as the German kali works, a large stand in the centre of the court showing samples of the deposits as mined and prepared for the use of agriculturists, while from a broad platform depend a number of charts explaining the composition of the product, and its uses in supplying potash, phosphoric acid, and nitrogen for impoverished soils. A series of photographs also shows the visitor the large works connected with this enterprise at Cologne, with their mines, manufacturing departments, and laboratories.

In the German section are also displays of many varieties of prepared food and drinks, several firms making a specialty of food preparations for infants. As in the Austrian section, mineral waters, cordials, and liqueurs, to say nothing of beers and malt extracts, are in liberal display. The proprietors of some thirty German resorts, at which are famous springs or baths, have a collective



MEXICAN WHEAT

Russia's exhibit, west of the French government section, demonstrates the varied resources of her vast empire in the form of structures of flax, tow, and hemp from the Caspian region, raw silk and tobacco from her Transcaucasian domain, and grains of all kinds from her central and southern provinces of Europe. Wheat and oats are displayed in sheaves, and threshed grain in vessels fashioned in imitation of bronze, a large collection of the latter arranged in the form of a lofty tower. The manufacture of candles is a flourishing industry in Russia, the largest and those of most elaborate design being used in the ceremonials of the church, of which some fine



HENEQUIN PLANT, MEXICO

specimens are here on exposition, arranged in structural forms. There are several imperial factories for the refining of sugar from beets, all of which have samples of their products, the government of Kieff adding to this collection specimens of honeycomb and confectionery.

Of more than 1,000,000,000 acres of arable land contained in European Russia, at least 60 per cent is under crop, the total yield of all cereals for 1892 amounting to 1,700,000,000 bushels against nearly 3,000,000,000 for the United States. Within recent years nearly 7,000,000 of emancipated serfs have redeemed or paid for their land in labor or kind with government aid, the average holding of the peasantry not exceeding ten acres per capita. Ere long the most favorable outlet for the poorer class of agriculturists will be in central and southern Siberia, a region whose resources are as yet but little appreciated, though gaining in favor as the railroad, now approaching its eastern verge, lays open to settlement its vast and virgin expanse. What the western and Pacific states were to our own republic, that will Siberia become to the Russian empire at no very distant day.

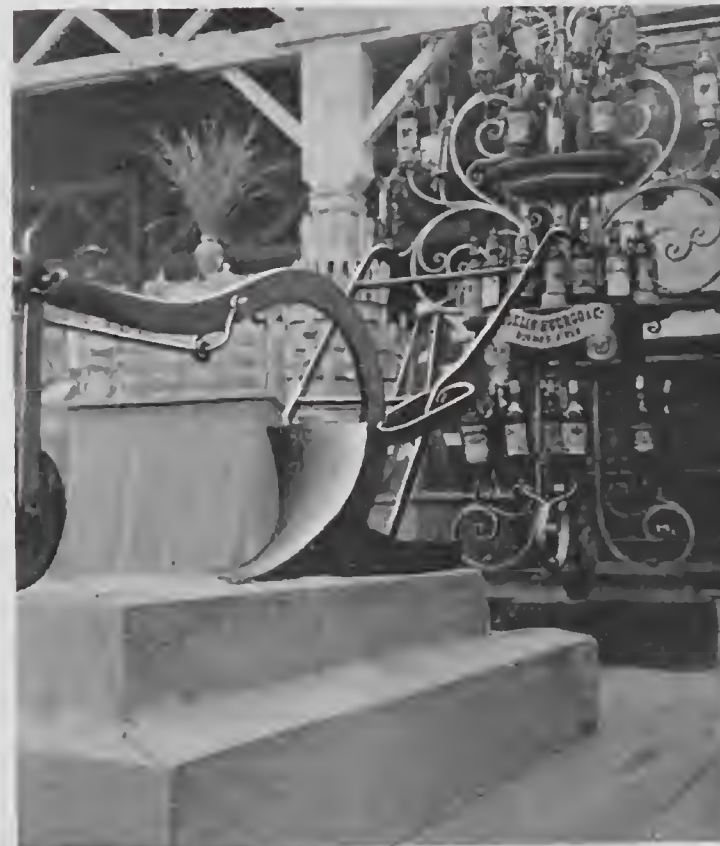


COTTON, BRAZIL

Italy occupies a small rectangular section in the southwestern portion of the main hall, adjacent to that of the agricultural colleges and experiment stations. Her display is of a somewhat miscellaneous character, including a large collection of olive oils and food preparations, as pastes, almond, and honey cakes, macaroni and cheese, chocolate, sugar, spices, sweetmeats, and liqueurs, with a few specimens of flax and hemp. Silk, one of her leading industries, with nearly 100,000,000 cocoons, gathered yearly from more than 5,000 cantons, and with 200,000 women and children employed in the treatment and manufacture of silk, is here represented by a single exhibit of larvæ. In line with the Italian group, but at the opposite side of the hall, and adjacent to the Virginia section, Greece shows her raw silks and olive oils, from various localities, with specimens of honey and honey-comb such as Attica produced long before Homer bethought him of the



IN THE BRAZILIAN SECTION



INTERIOR, ARGENTINIAN SECTION



COLUMBUS ARCH, PERISTYLE

famous simile in which the Grecian hosts are likened to a swarm of bees covering the plains of Troy.

Holland, Sweden, and Denmark are grouped together in the northeastern portion of the hall, an Amsterdam chocolate house monopolizing most of the space allotted to the Netherlands. In its booth are dummies of life-like appearance, representing women and children about to receive their favorite beverage from the hands of a waiting maid. Somewhat of a curiosity is the Java kapok, a fibre used for bed-filling, and for which are claimed the advantages of remarkable elasticity and lightness.

Sweden illustrates her paper manufactures from wood pulp in the form of a small pavilion within her section, its base composed



MOUNTAIN HUT, BRAZIL



ARGENTINIAN WINES AND GRAINS

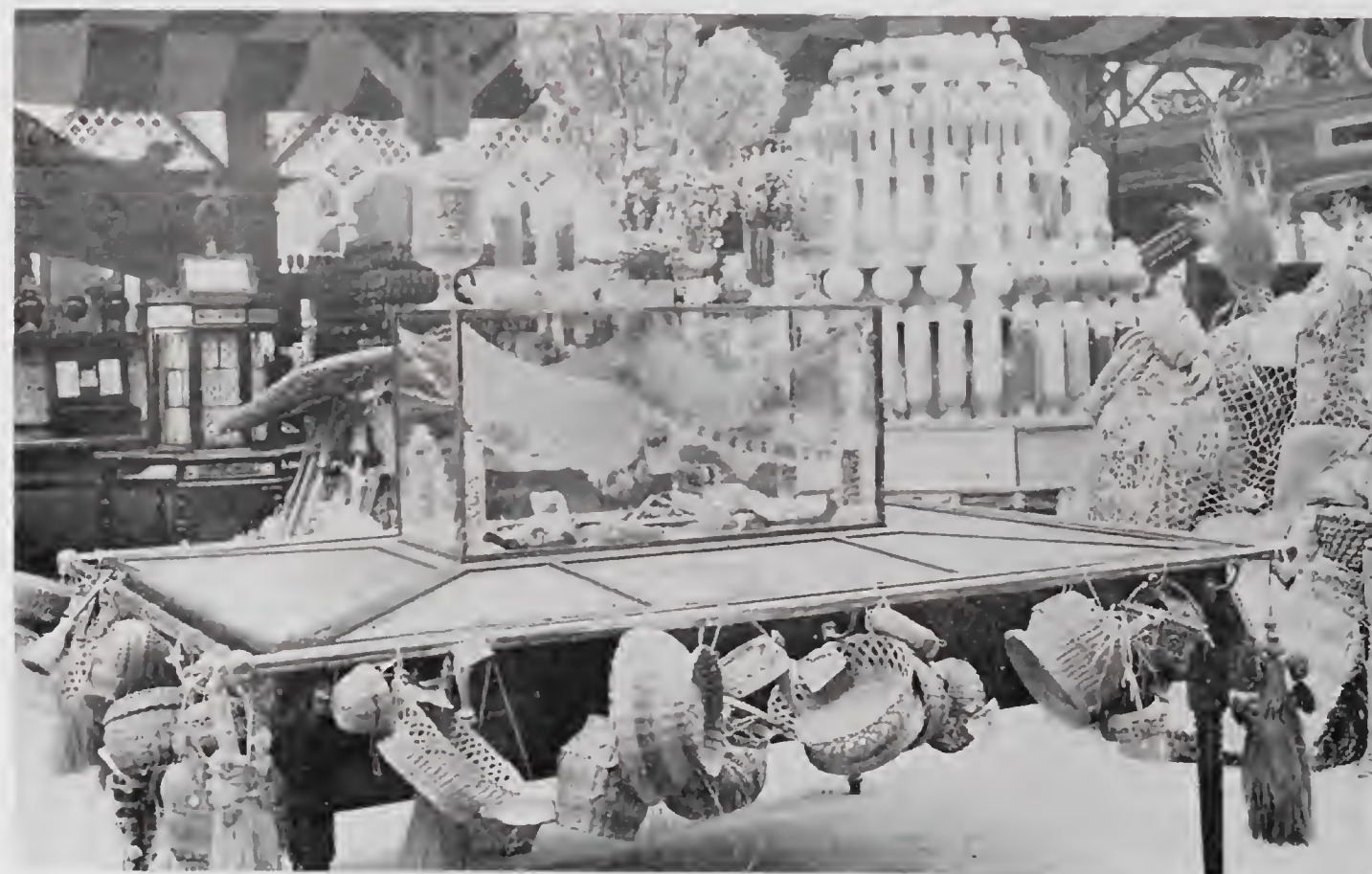
of segments of the trees generally used for the purpose, a large twisted column representing the finished product. Next to paper, Swedish punches, including such as are made of arrack, are the most prominent exhibits, while in the adjoining Danish collection the display of butter and a milking machine whose workings are illustrated on a model cow, are features not to be overlooked. In the latter is a booth filled with chocolate from a Copenhagen factory appointed as royal purveyor, and containing busts of the king of Denmark made of that article.

The main entrance to the Danish pavilion represents a farmhouse, with high thatched roofs and broad gables, and with national types of women and pastoral scenes depicted on panels in the outer walls.

Spain and the Philippine islands jointly occupy a pavilion west of the main northern portal. The exhibits of the former include summer, red, and winter wheat, with other grains, of which some are prepared for use in various forms. There are also preparations of food and drink, as soup, pastes, arrow-root, tapioca, confections, honey, and chocolate. Of alcoholic, vinous, mineral, and other beverages there are many samples, and in the group of olive oils are 100 specimens. Of wool there are a few assortments, and in the form of a hut are the fibres peculiar to



SOUTH AMERICAN PRODUCTS



BRAZILIAN BASKETS AND SILK COCOONS

the Philippine islands. Porto Rico sends an assortment of coffees, sugars, tobaccos, cigars, native woods, and curios. Near by is the booth of Trinidad, some of whose exhibits duplicate those of Porto Rico, but contain also collections of birds, with special native products and curiosities.

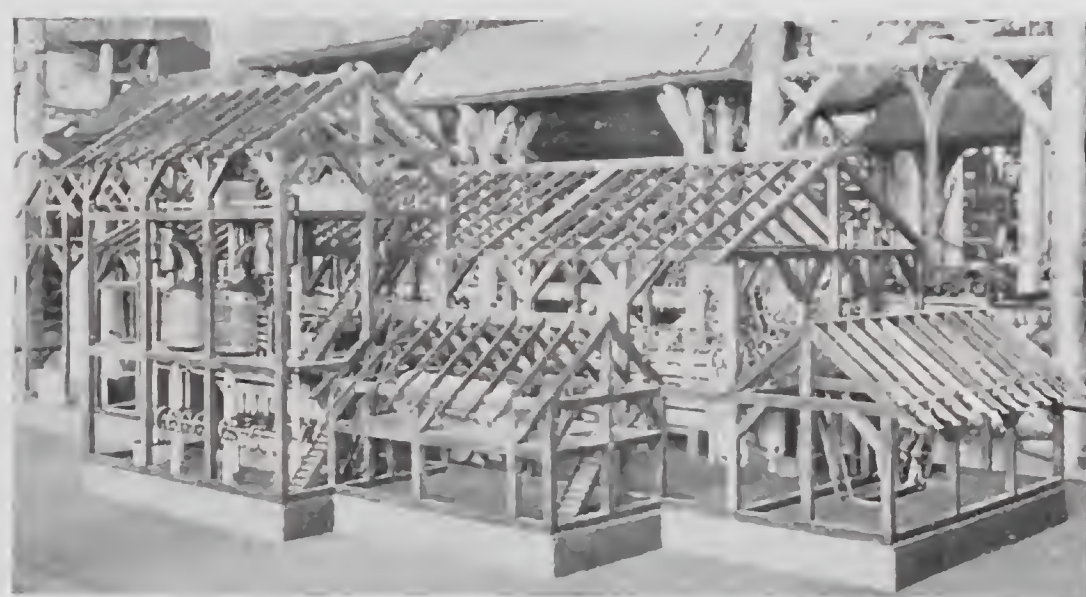


PARAGUAYAN EXHIBITS



ALLIGATOR AND SNAKE SKINS, PARAGUAY

varieties of seeds, spices, and grains are here on exposition, and there is a fair collection of the sheath-like fruit of the vanilla. Sugar made from the cane, and soap from cotton seed oil, represent important branches of industry, and there are specimens of wild cotton indigenous to Mexico. Samples of native drinks are plentiful,



SUGAR MILL, CUBA

including pulque and other liquors extracted from native plants, with such as are made from the orange, lemon, apple, pear, and peach.

Richly decorated in green and gold is the pavilion of Brazil, with its attractive and varied display. Noticeable among the exhibits are pyramids of wool and tobacco, and a hut constructed of sections of fibrous plants, with hats of the same material arranged in the shape of festoons. There are also in various grades and forms coffee, sugar, silk, grasses, and manufactures of native fibres, with Brazilian wines and other beverages.

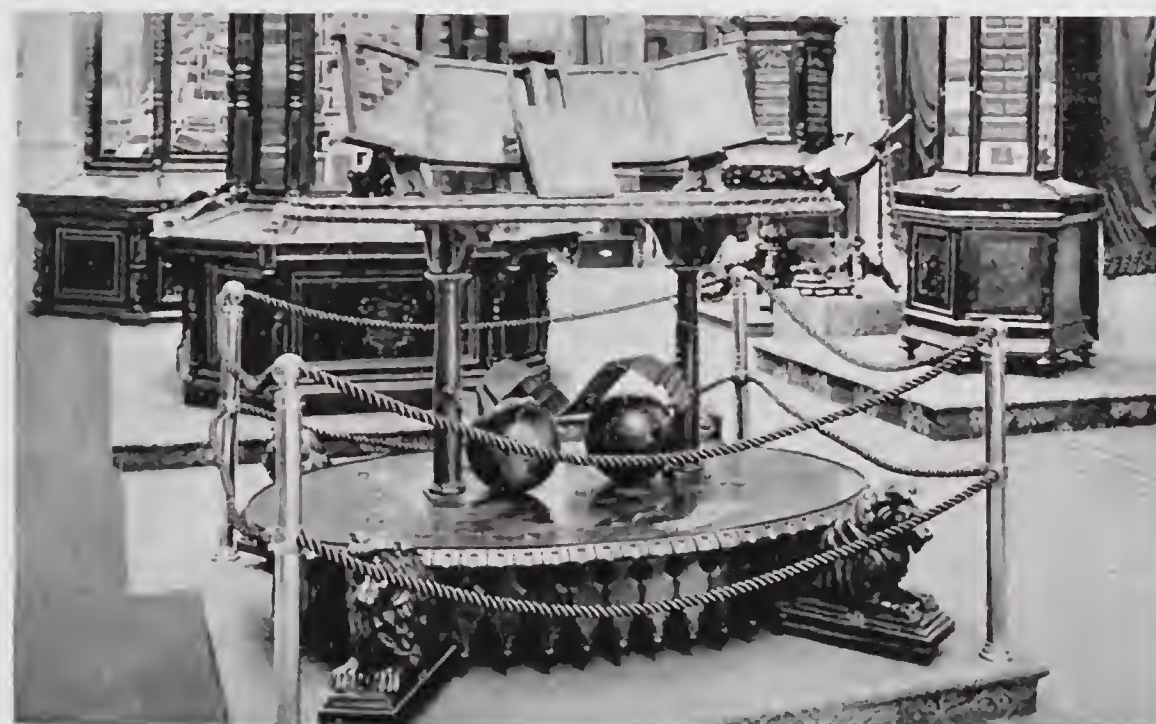
The Argentine republic gives prominence to her stock-raising industries. Wool in the fleece and other forms is everywhere in this pavilion, one of the walls of which is almost covered with tanned hides and pelts. Of wines, sugars, and tobacco there is also a creditable display. Paraguay shows her medicinal plants outside of her section. Within are several samples of native tea, which there takes the place of the Chinese product, and is largely exported to other countries. Though not suited to American palates, it is a less injurious beverage than most of the varieties that Japan and China send forth. The exhibit indicates that Paraguay intends to make herself known as a tobacco-growing country. Here also is the cassava, or manioc

In the Cuban pavilion, the bulk of the exhibits consists of tobacco in leaf, or in the form of cigars, and sugars of various grades manufactured from the cane. Upon the wall are statements from chambers of commerce as to the production of these staples, and also of Cuban minerals.

Prominent among the exhibits of Latin-American countries are those of the Mexican section, and especially as to their collections of tobacco, fibres, and grains. Side by side with cigars and cigarettes is the raw material in leaves of phenomenal growth, while the fibres of the maguey plant are heaped in and around a huge central basin, and appear elsewhere in the form of rope, matting, and cloth. Some 2,000

varieties of seeds, spices, and grains are here on exposition, and there is a fair collection of the sheath-like fruit of the vanilla. Sugar made from the cane, and soap from cotton seed oil, represent important branches of industry, and there are specimens of wild cotton indigenous to Mexico. Samples of native drinks are plentiful, including pulque and other liquors extracted from native plants, with such as are made from the orange, lemon, apple, pear, and peach.

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INTERIOR CUBAN EXHIBIT



JAPANESE PAVILION

root, from which tapioca is prepared. As this is a collective display, it includes articles of pottery, carved wood, canes made of native trees, laces, and other illustrations of industries and resources.

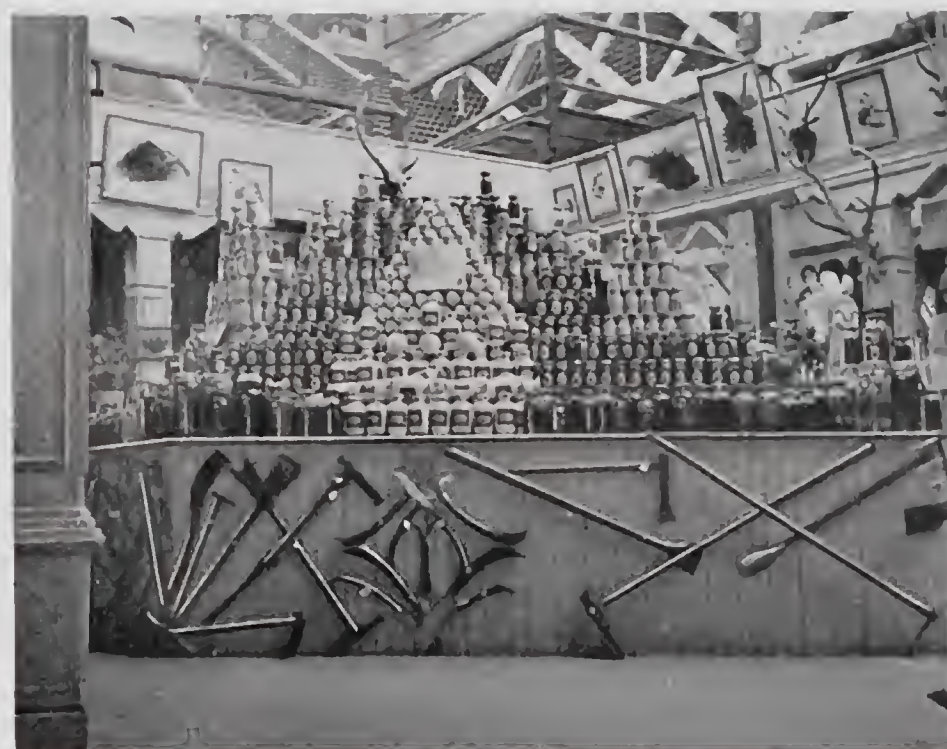
On the panels of Ecuador's miniature pavilion are depicted the governor's palace at Quito, and scenes typical of the republic. The exhibits include tapestries, porcelain, paintings, and wood and ivory carvings, the last of excellent workmanship.

A model of a human skull, carved from wood and skilfully colored, is a remarkable specimen of imitative work. Among manufactured articles—for this is also a collective display—may be mentioned boots and shoes, saddlery, hats, clothing, and tinware. There is a small collection of native woods, and curios and relics are plentiful, including a few primitive agricultural implements, and costumes of Indians.

In the northeastern portion of Agricultural hall, Uruguay has an ambitious display, representing many branches of her industries and arts. In the centre of her pavilion is a column of dark wood, erected by the Liebig Extract of Beef company, whose works and yards at Fray-Bentos are probably the largest industrial establishment in South America. Around it are bottles of the extract, and photographs of the factory and grounds, with specimens of candles and soaps in a case adjacent. Elsewhere are fleeces and piles of long silky wool, with all the grains of the temperate zone, with liqueurs and mineral waters, minerals and woods, and collections of paintings, books, and specimens of work from pupils of the public schools. Among the pictures, one of the most

remarkable represents a young mother, drawing aside the coverlet from a sleeping infant, her hand upraised in a gesture of warning. The educational exhibits abound in specimens of kindergarten work, and there are many illustrations of proficiency from pupils of the higher schools, conducted jointly by the government and the catholic church.

South of the Mexican section is the Japanese pavilion of bamboo and matting, its outer walls adorned with green panels of the latter material. The exhibits of tea, with photographs illustrating the methods of picking and packing, are of special interest to the people of the United States, who consume so large proportion of this product. Jars and boxes of rice and vermicelli, leaf tobacco and cigars, wax made from berries as well as the more common kind, plantain fibre, hemp, and matting are also on exposition. There is a large assortment of cocoons, and among other curiosities are gourds made of snake skins. Brandy manufactured from rice, beers and vinegars, fish sauces, and other condiments and beverages, some of them peculiar to the country, are arranged side by side with canned salmon, trout, beef, lobsters, oysters, and sardines.



JAPANESE CANNED GOODS



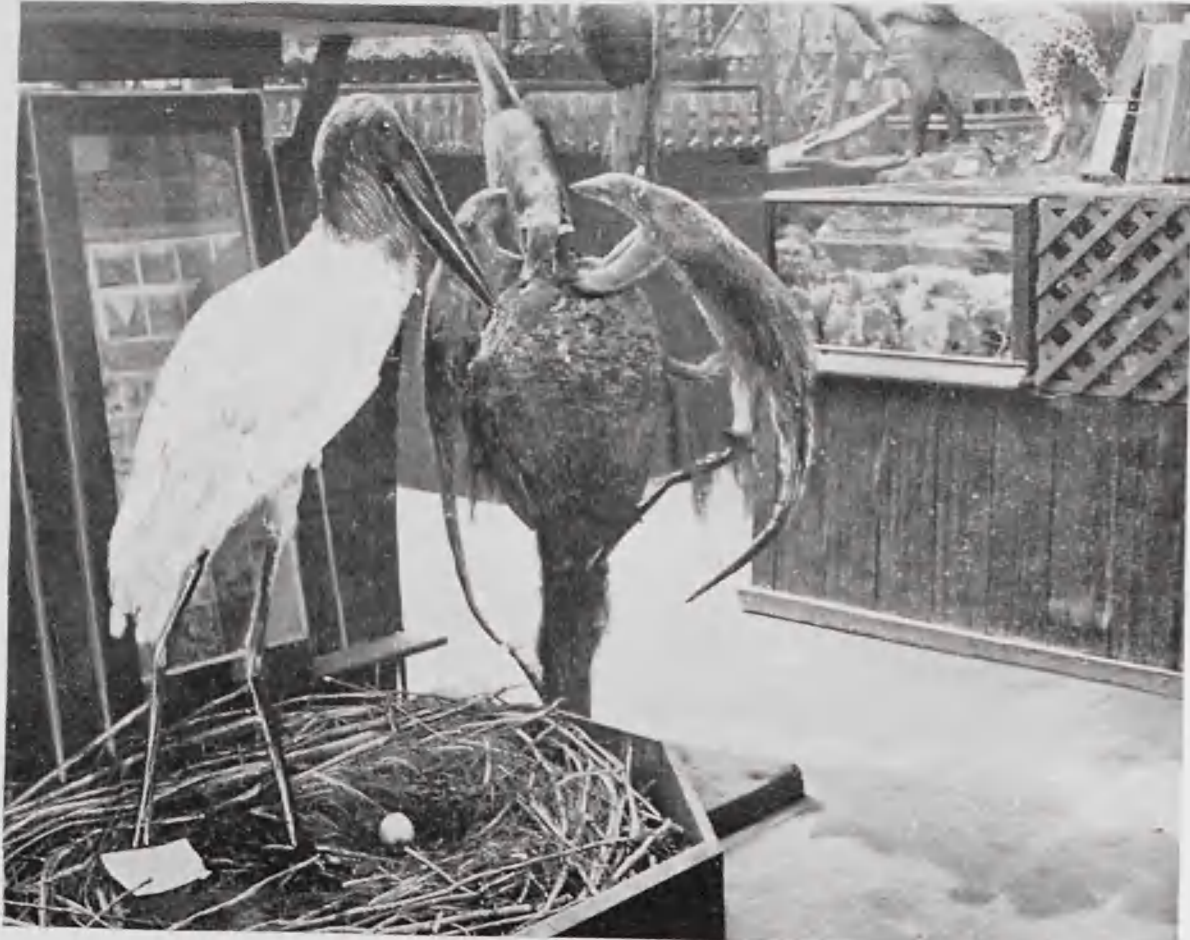
ALLIGATOR, TAPIR, AND JAGUAR, BRITISH GUIANA



ANT EATER, BRITISH GUIANA

An attractive feature is the collection of birds and fowls, including such as are found in forest and on farm, and those which are used for food. Among them are bantams and Siamese chickens, and mounted on high in a coop is a pair of long-tailed fowls, one of which has an appendage more than ten feet in length. In the pictures scattered throughout the pavilion are illustrated tea plantations and processes, together with many ingenious devices whereby the Japanese ensnare the birds of forest, field, river, and lake. These include decoy birds hung in cages, nets attached to long bamboo poles, and limed ropes stretched over the water, all of which are represented in graphic art.

British Guiana and Curacao, the latter a small colony of the Dutch West Indies, have small adjoining exhibits in the northwestern corner of the hall, in which are brought together many forms



STORK AND ANT EATER, BRITISH GUIANA



MONKEYS, BRITISH GUIANA

whose roar is out of all proportion to its size, with ant-eaters, deer, squirrels, raccoons, armadillos, opossums, and in the

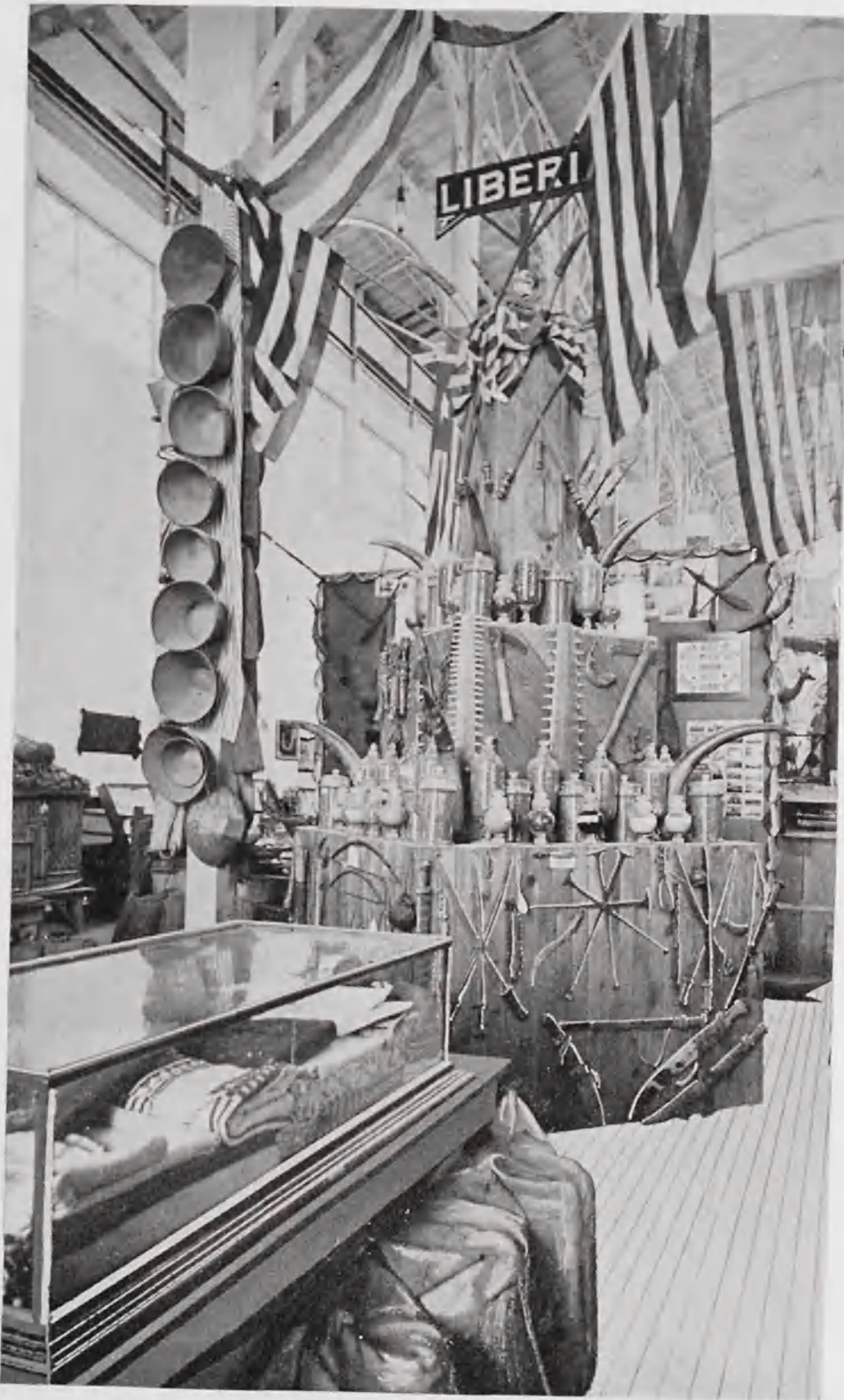


SLAVES IN COSTUME, CURACOA

centre of the pavilion, a jaguar perched on the shoulder of a tapir, illustrate the animal life of forest and water. Another illustration of forest life is presented in the highly polished sections of native woods arranged around the structure, unfinished logs serving as pillars and beams. Thus are exhibited more than 100 specimens suitable for ship building, railroad ties, cabinet work, and other purposes. A series of pyramids, gradually rising in height, and increasing in size, illustrates the progress

of wild and civilized life. A case in the latter section contains the antiquities of Carib tribes, and near it is a burial urn of clay. Among other curiosities are samples of shell and feather-work, whose bright colors stand forth in strong relief.

British Guiana has a more elaborate display, as befits her resources and commercial importance. Birds of brilliant plumage, crabs, turtles, sword-fish, a sea cow, an alligator, a so-called bear howler,



LIBERIAN SECTION



SIAMESE PAVILION

in the production of gold from 1884, when the entire yield was but 250 ounces, to 1892, when the export was nearly one hundred times as much.

Johore, in the southern extremity of the Malay peninsula, has a tasteful pavilion between the Brazilian and Mexican sections. From the main entrance floats the star and crescent, and near it, within the booth, is a large bust of the sultan, with photographs of his palace, and the scenery of his dominion. On one side are specimens of printing from the imperial establishment at Singapore, and on the other, books and charts from the native schools, with a heavy wooden block to which the rebellious pupil is chained. The exhibits include samples of coffee, tea, copal, rice, sweetmeats, betel nuts, spices, sago, rattan, and preserved fruits, the last including a species of plum, which, as is claimed, is the most luscious of all the fruits. There are also shown the various tools by which the pith is extracted from the palm, grated into powder, and kneaded with water, in the preparation of sago flour, several jars being filled with sago cakes. Ranged along one of the outer walls are groups of agricultural implements, and strung beneath the cornice is the dried skin of a huge boa constrictor.

The forest wealth of Johore is illustrated in another portion of the hall by polished sections of native woods, and by a large and beautifully carved model of the royal residence, with the dining room and kitchen which connect with it. Here also are sheets of the reddish substance stripped from the inner bark of a native tree, and largely used for clothing.

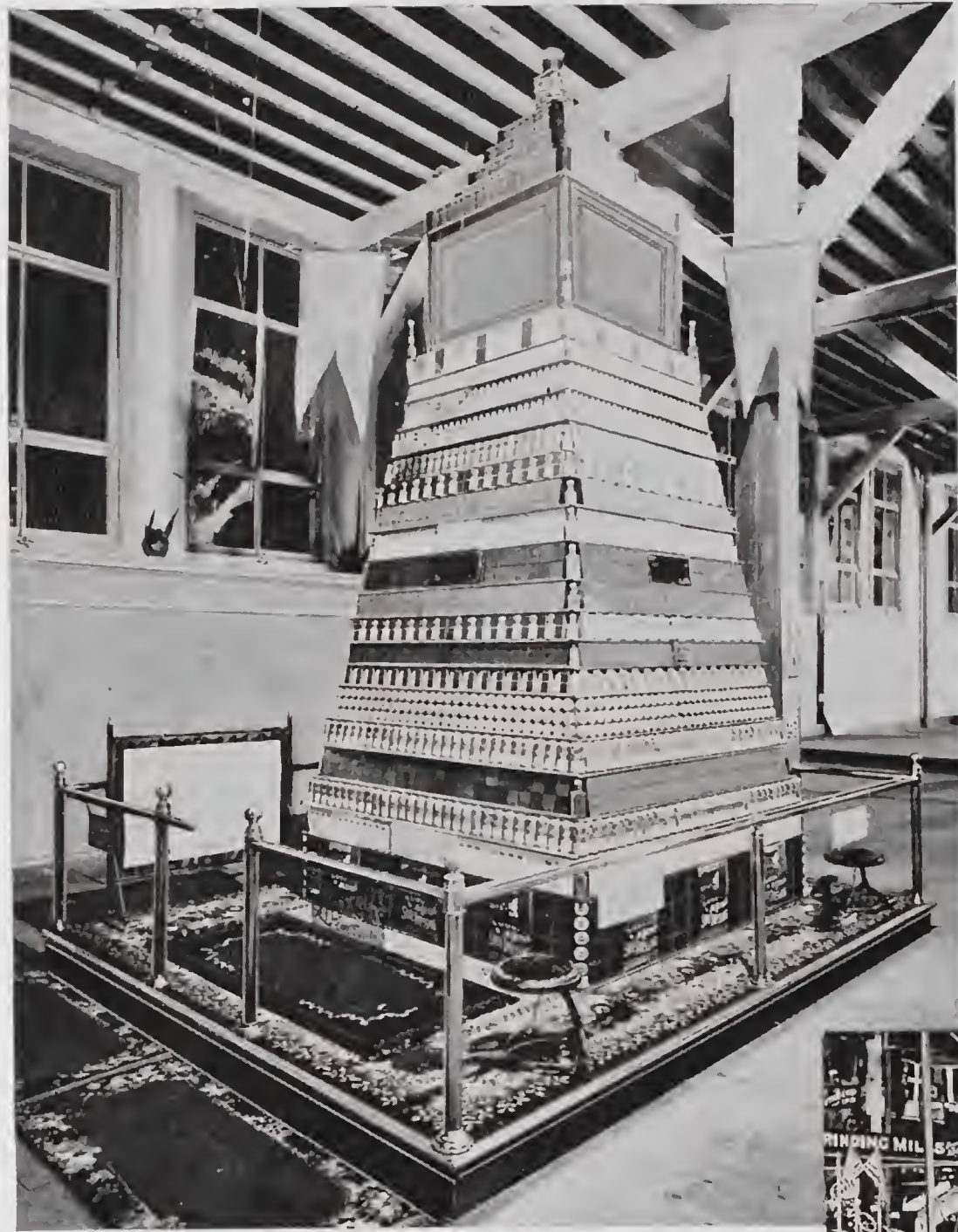
In the centre of the United States pavilions is a Persian exhibit of rugs, tapestries, ceramics, brass-ware, and wood-carvings. The fabrics come from all the industrial centres of the empire, some fashioned almost entirely of silk, and others of the wool of the Angora goat. Brilliant colors seem to be in disfavor, deep blues and yellows being mostly used, except for the silken rugs of Shiraz with their changing hues, and those of Khorassan dyed in brilliant carmine. Gold and silver embroideries



ORANGE FREE STATE



ADMINISTRATION PLAZA CHICAGO DAY

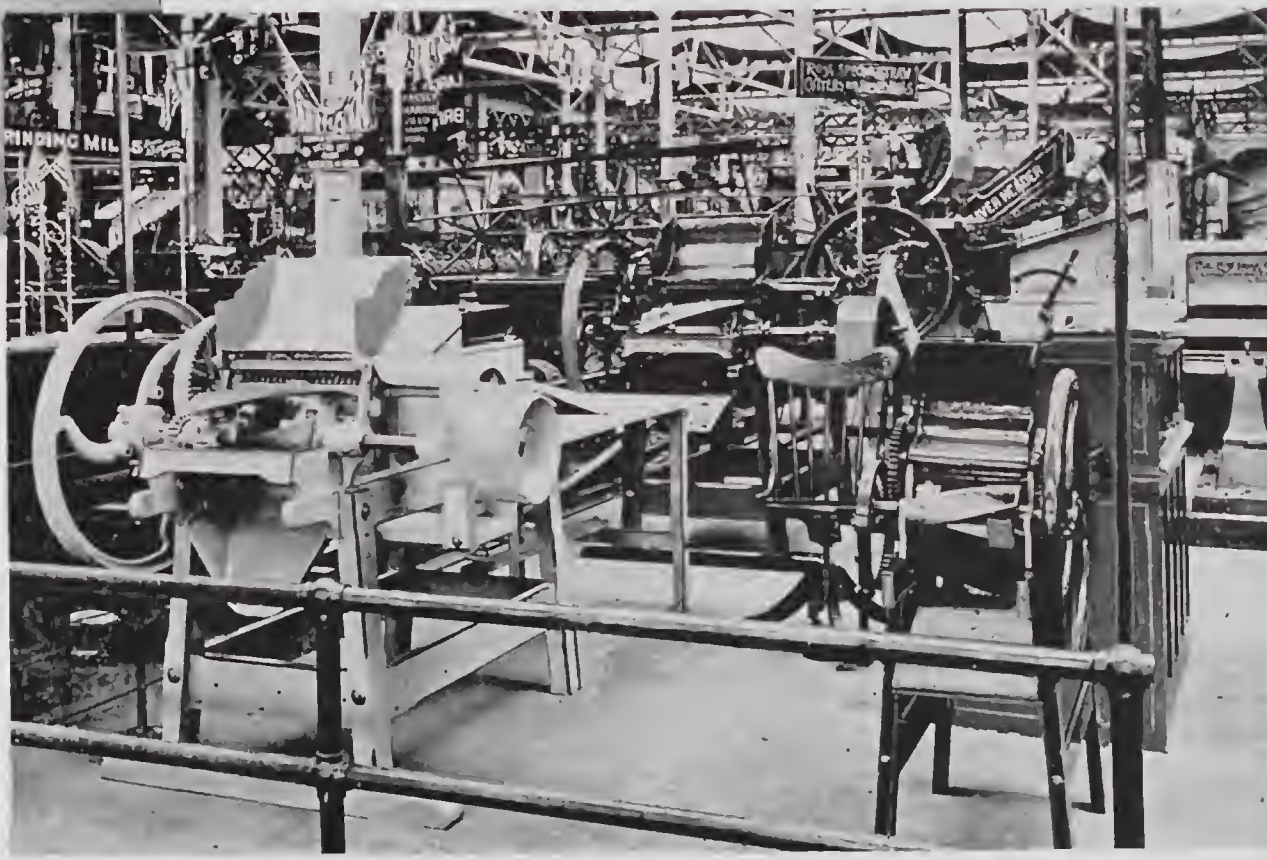


OIL PYRAMID

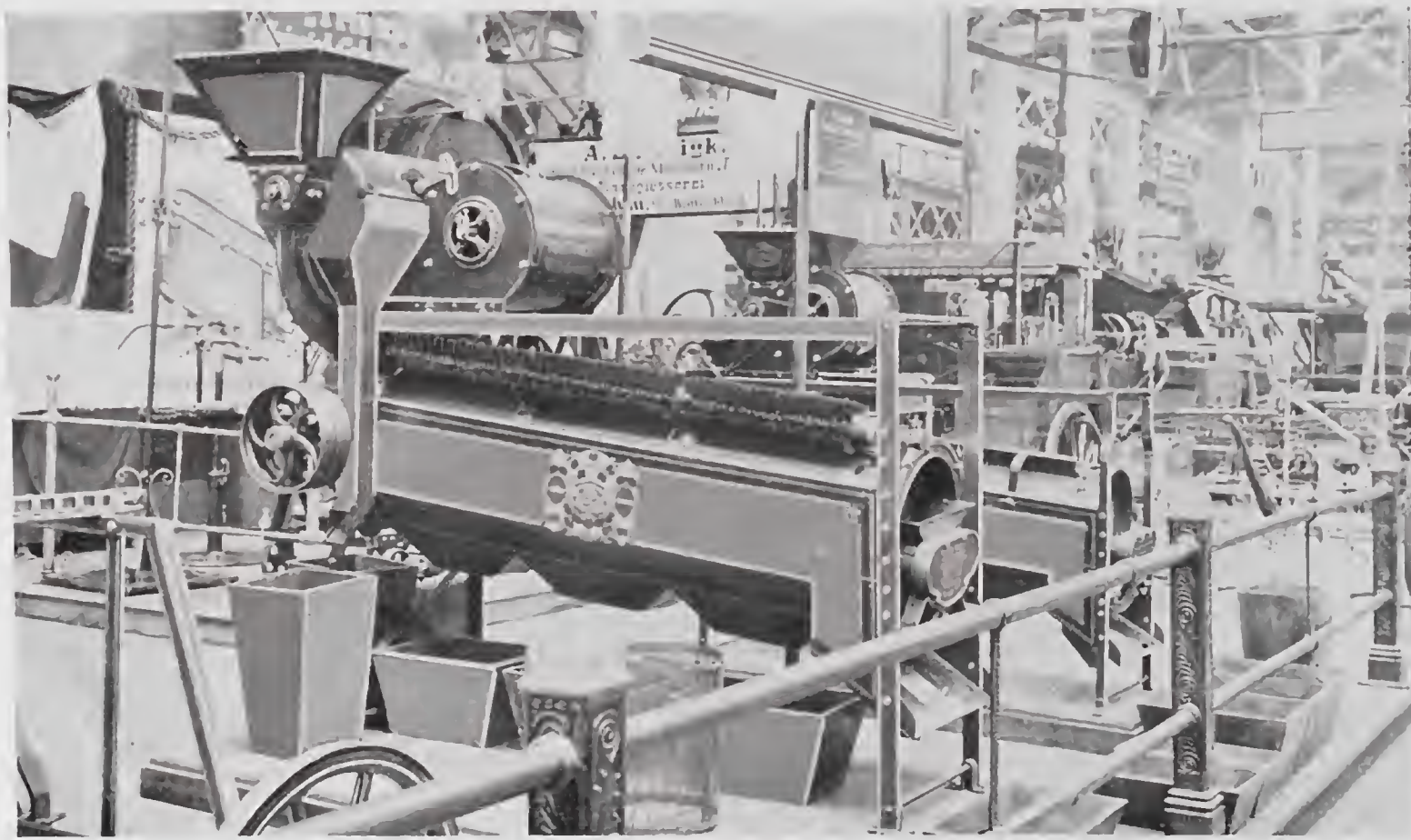
ing, and curios illustrative of life in Liberia, there are bracelets of iron, brass, and copper, leather bags and water bottles, blue and white cloths, warriors' caps, and women's skirts and head-dresses of grass, with leather charms, hideous wooden idols, spears, swords, daggers, and dirks, looms, inkstands, pens, bars of iron, wooden sandals, embroidered gowns, hammocks of cloth, yarn, and grass, powder horns, photographs, postage stamps, postal cards, metal and paper money, newspapers and books, strainers for palm butter, palm

and several specimens of rich jewelry work are also on exposition; but more precious than these is a translation of the entire Koran written on tiny parchment leaves, and enclosed in a small box which could be easily carried in the pocket.

In the extreme northwest corner of the main building is the Liberian exhibit, which, though small in size, displays to excellent advantage the resources of the West African republic. Two immense horns form an arch to the chief entrance of the pavilion. Animal life is here in many forms. There are horns of cows, of antelope, elk, and deer, tusks of elephant and hippopotamus, and in the background is grouped a large collection of the skins of deer, monkeys, squirrels, tiger-cats, leopards, otters, coons, and snakes. Heads of different animals protrude from the walls, and more strange than all else is the miniature hippopotamus mounted upon a table. Until its capture in Liberia, a few years ago, this was believed to be an extinct species, and to-day there are only two other mounted specimens in existence, one in Paris and the other in London. As to implements, weapons, cloth-



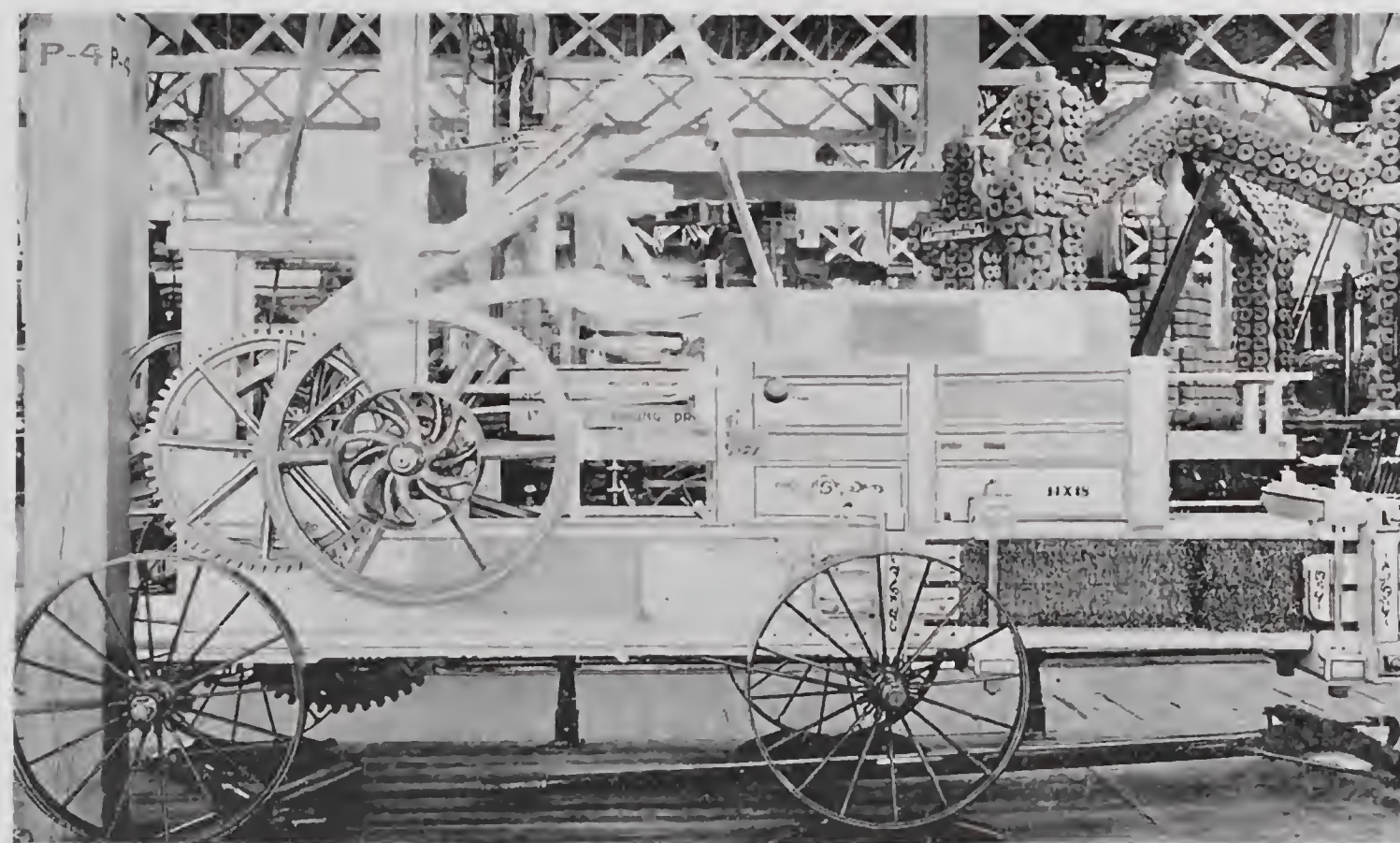
FODDER CUTTING MACHINE



CORN SHELLERS

oil gourds, blacksmiths' tools, and bellows, chairs, stools, and trunks of bamboo, fishing nets and baskets, and fine needlework. Among the last is an embroidered satin quilt, upon which is represented in raised work a coffee tree in full bloom.

From an enumeration of the articles displayed, it would be inferred that Liberia is still a country of tribal distinctions, as well as a community of civilized and intelligent people. The contrast in the social conditions of the republic is illustrated in a reproduction of the bamboo hut, thatched with



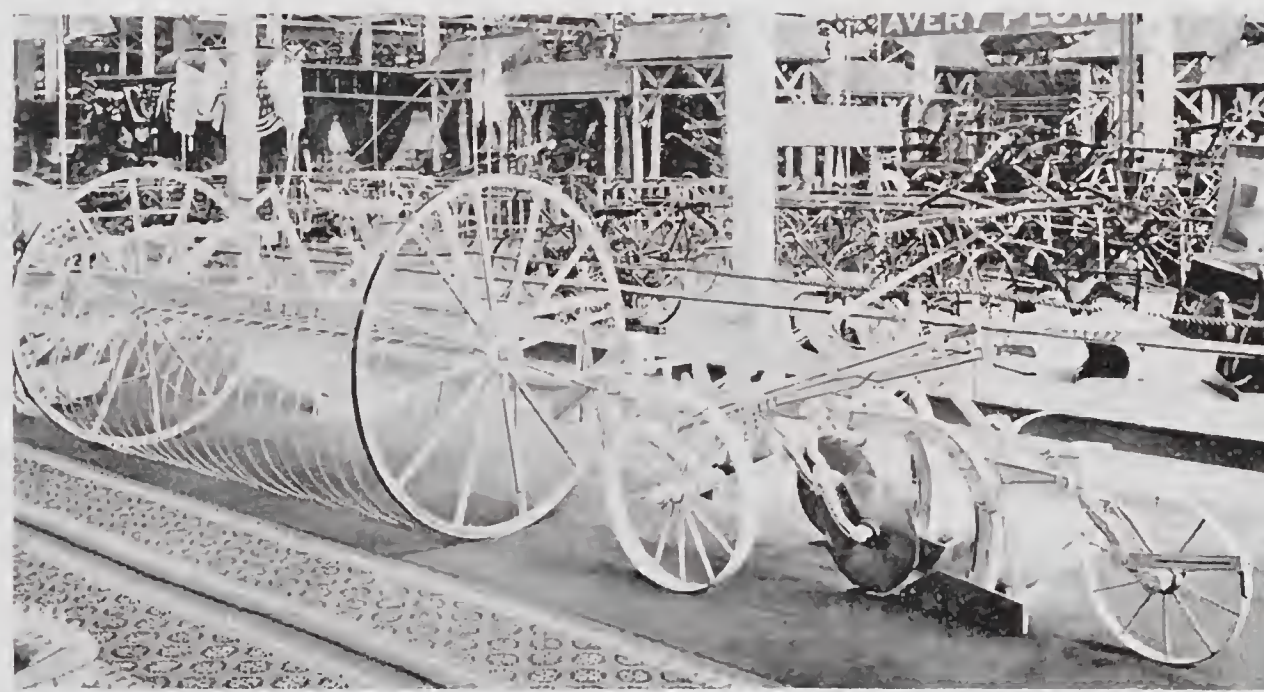
BALING PRESS FOR HAY AND STRAW

glistens near the entrance, and in the interior is a structure composed of jars of grain surmounted by a native deer. Near the Mexican section Siam has a booth containing grains, tobacco, edible birds-nests, and models of primitive vehicles and agricultural implements.

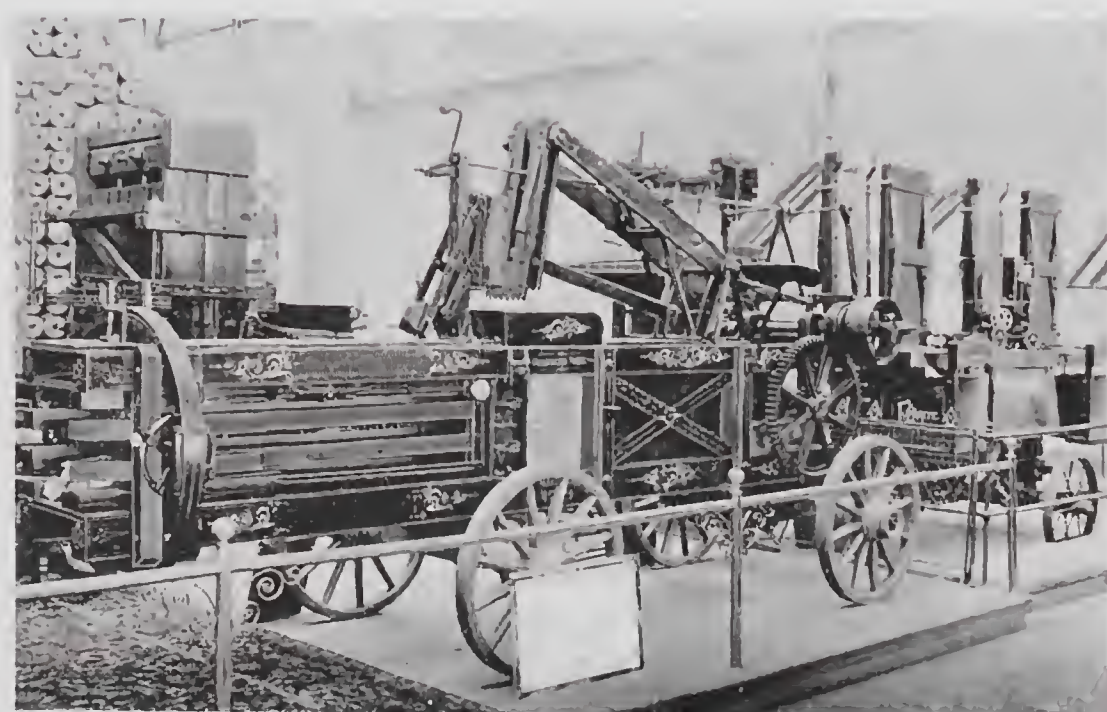
Along the aisle which separates Agricultural hall from its annex, are the collective exhibits of seeds, oils, and packing industries. Several of the first are housed in attractive pavilions; but as the main collection of their exhibitors is in the Horticultural building, this is by comparison a minor display. Among packing houses, however, such firms as Armour and company, Swift and company, and others of world-wide repute, not only show manufactured products, as butterine, stearine, lards, and oils, but also their methods of packing, preserving, and transporting meats. One firm exhibits a model refrigerator car, with glass sides, its contents neatly arranged for shipment.

The hog is seen in all postures, and fashioned of many materials. One group contains a stuffed animal in a gilded chariot, with shoats in place of steeds; in another is a huge hog made of lard, with spectacles on snout, and pen and inkstand beside him, while a third exhibitor symbolizes perhaps the prosperity which pork has brought him in the form of a group of golden pigs around one of the pillars of his pavilion.

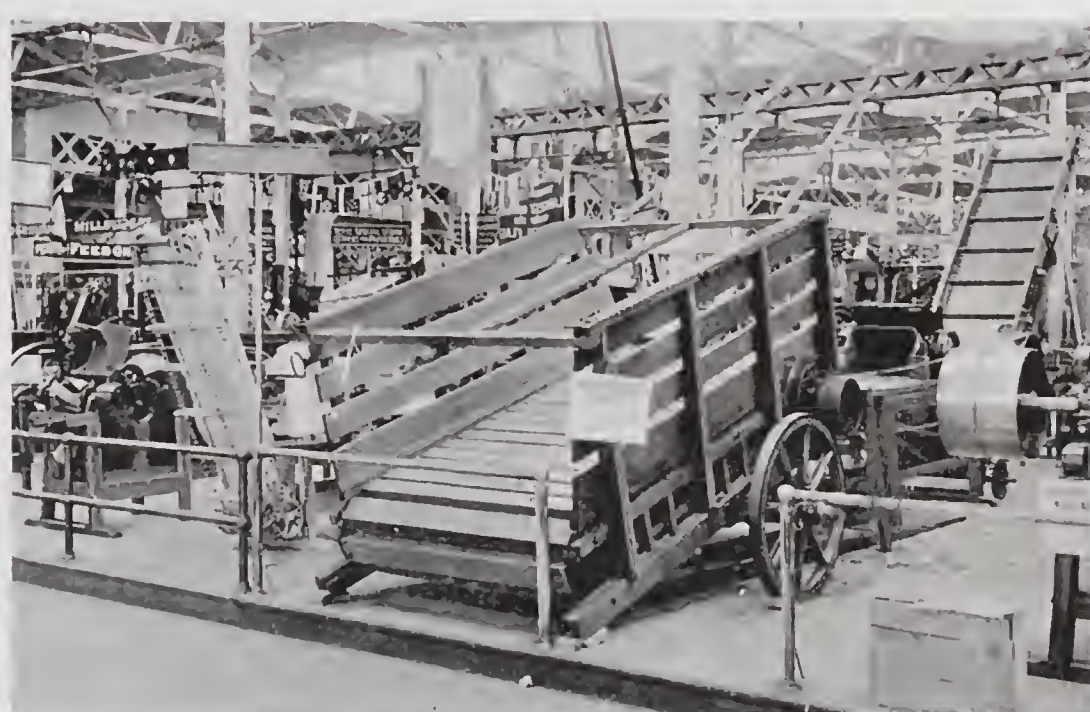
The American Cotton Oil company, of New York, has a structure in this vicinity, in the shape of a circular colonnade of Corinthian pillars, joined by metallic garlands which meet in the centre, and support an American eagle perched on a globe, the entire composition resembling frosted silver. Opposite is one of somewhat similar



HAY RAKE



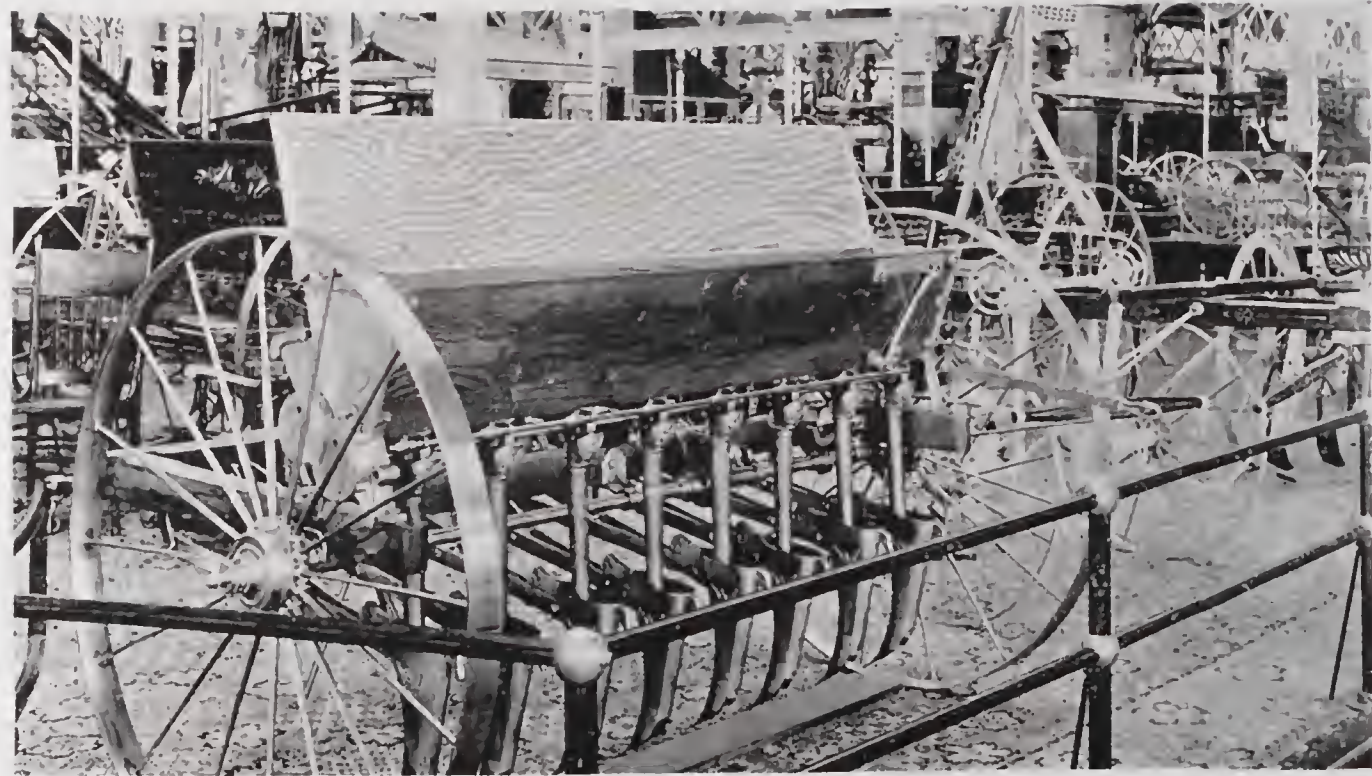
BALING PRESS



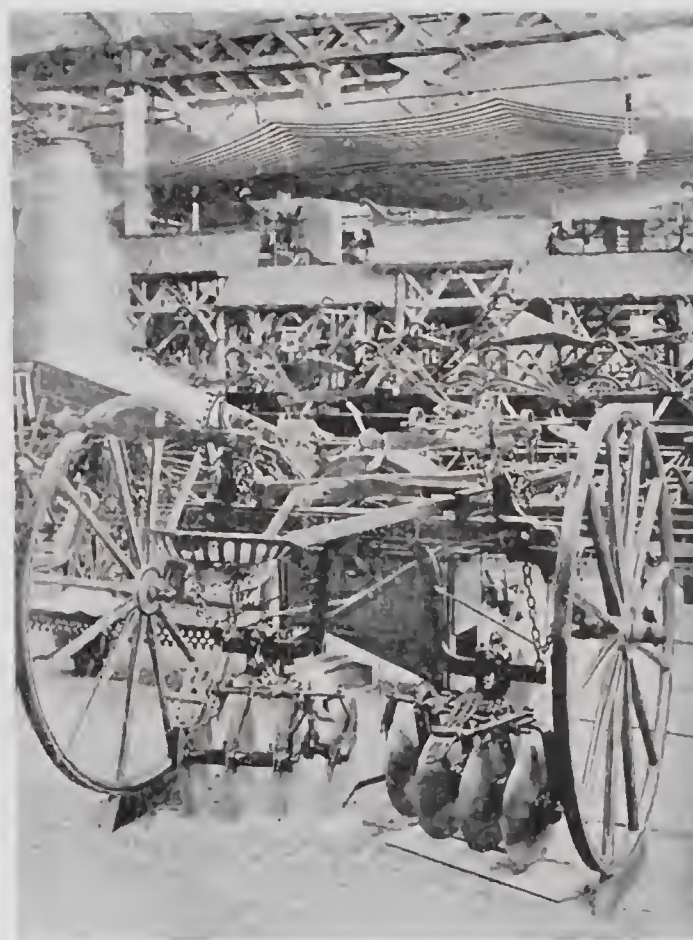
FODDER CUTTER

palm leaves, and the modern Liberian house, with its two stories and attic, surrounded by wide verandahs, and containing spacious halls, and airy cheerful rooms. Among the exhibits which show the products of the country and its growing commerce, may be mentioned coffee in bags and jars, sacks of cocoa and of red, blue, and yellow dyes, bundles of fibres of the bamboo and plantain, boxes of iron ore and ivory, barrels of palm and nut oils, bunches of rice, and cases of crude rubber.

The Orange Free State has an attractive home in the southwestern portion of the hall, decorated with skins, pelts, and ostrich plumes. A case of rough diamonds



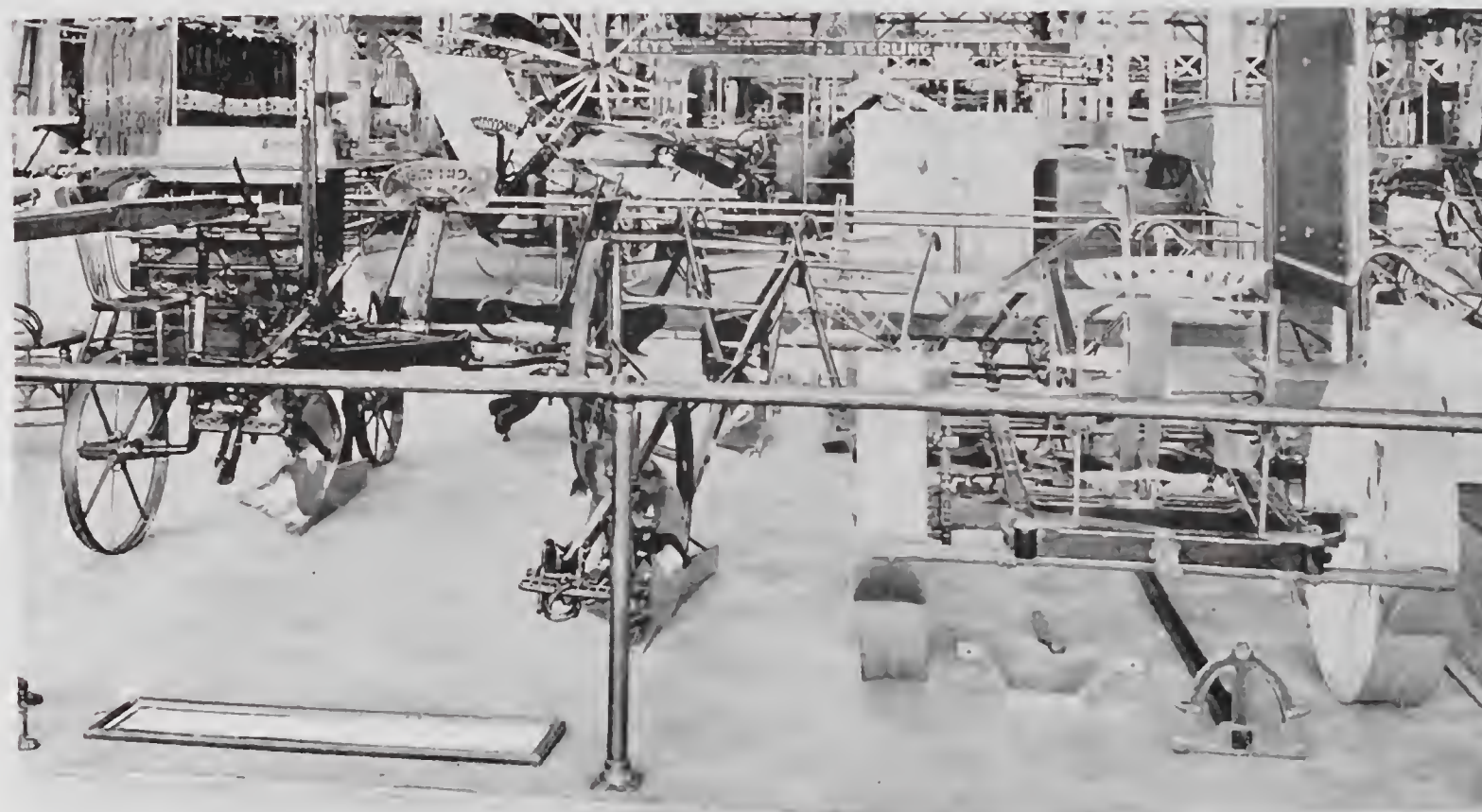
A MODERN DRILL



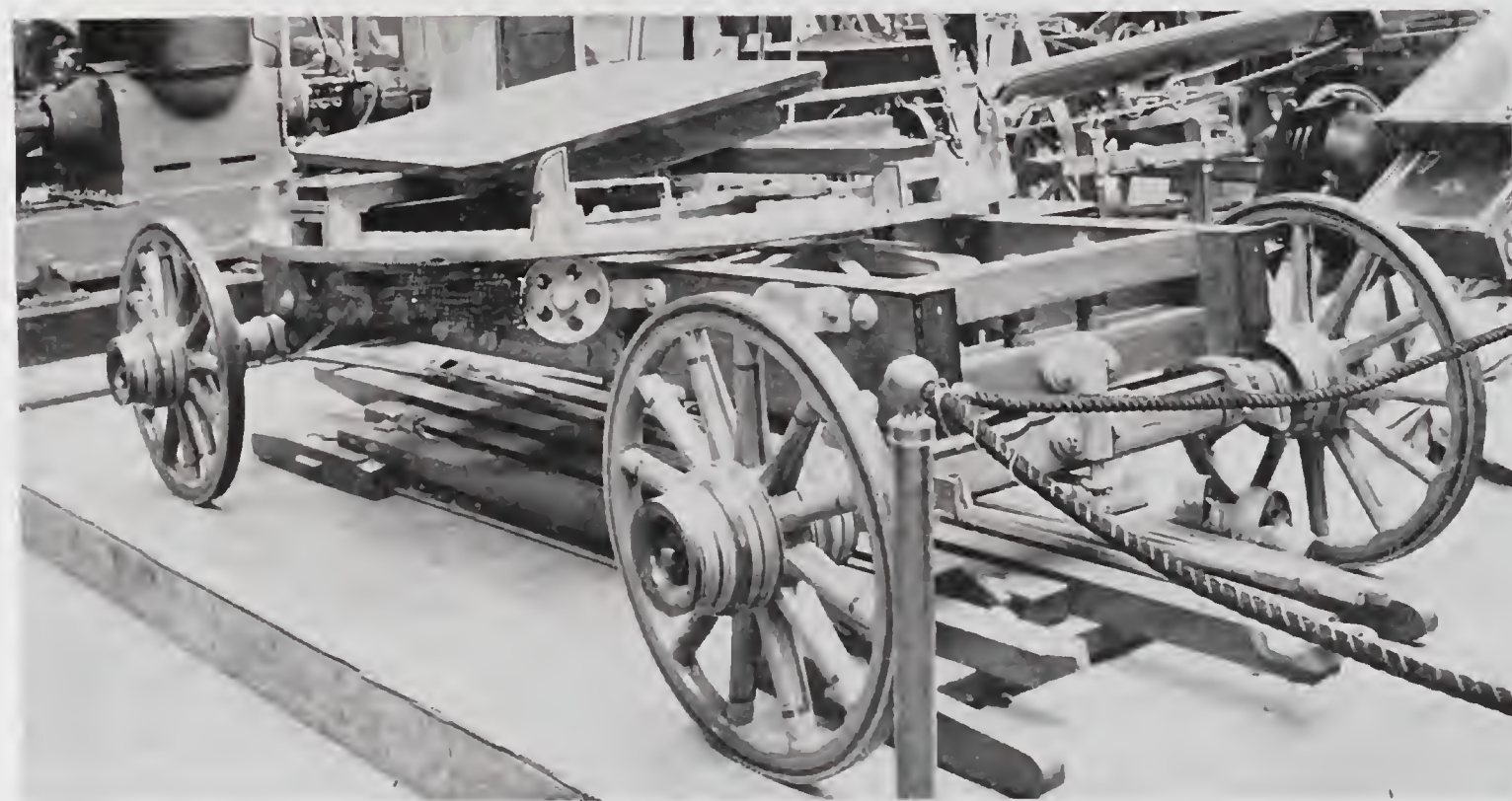
CULTIVATOR

design, representing one of the company's departments transacting business under another name, and manufacturing a preparation of cottonseed oil and beef fat known as cottolene.

In the northern portion of the annex, Canada, France, Germany, and Russia have a collection of agricultural machinery, together with such as is used for manufacturing farm products into food and other preparations. Apart from these, the annex is mainly occupied by the collective exhibit of the United States, Illinois, New York, Ohio, Iowa, Minnesota, Wisconsin, and Michigan, combining to present a forcible illustration of American ingenuity and industry. From the special forms of agriculture developed in various sections of the country have been evolved the hundreds of machines here placed on exhibition. Among them are the plows used on prairie lands, and such as are specially constructed for the cultivation of hill-sides. There are harrows and pulverizers, threshing machines and separators, reapers and binders, fanning mills and



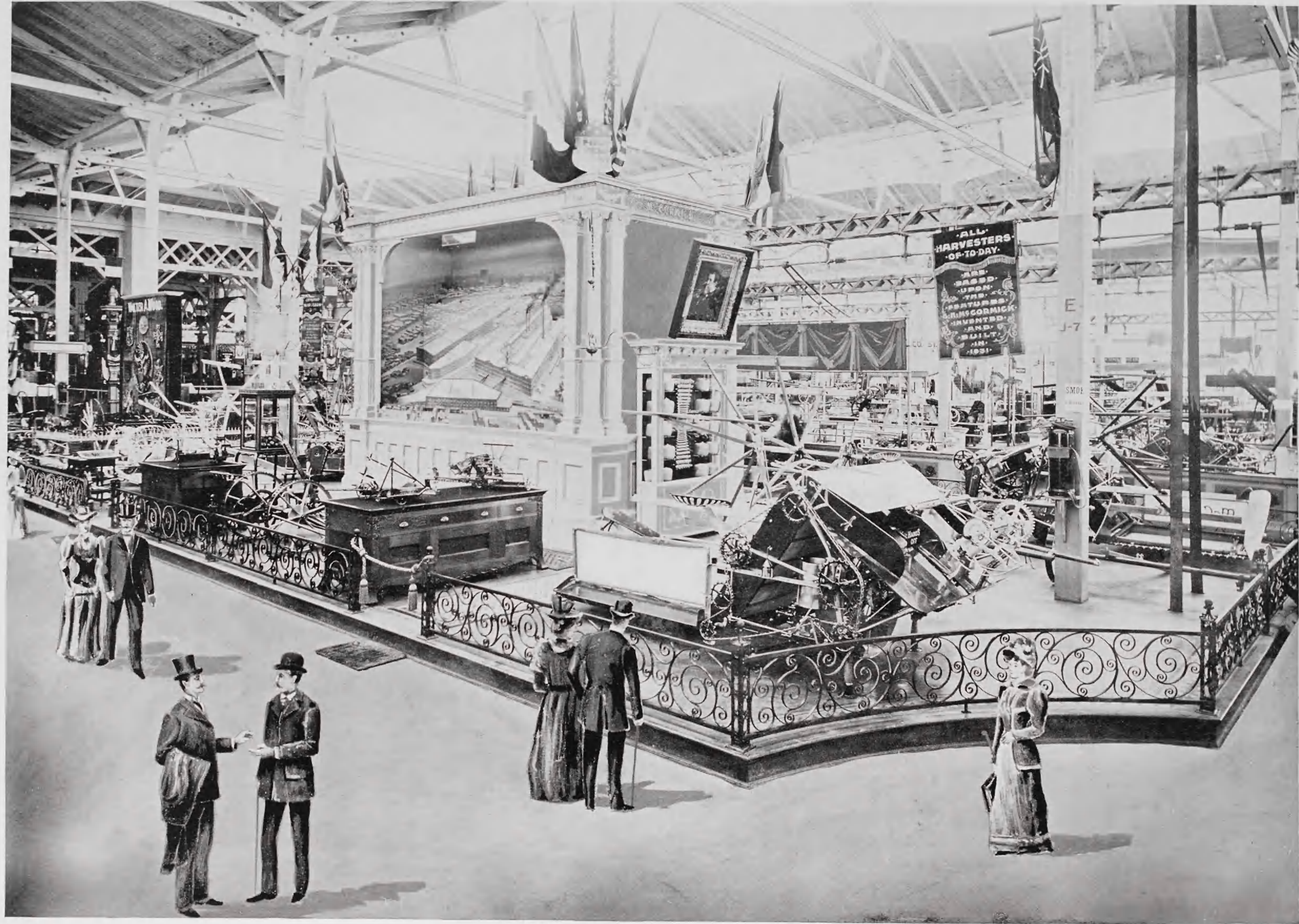
AGRICULTURAL IMPLEMENTS



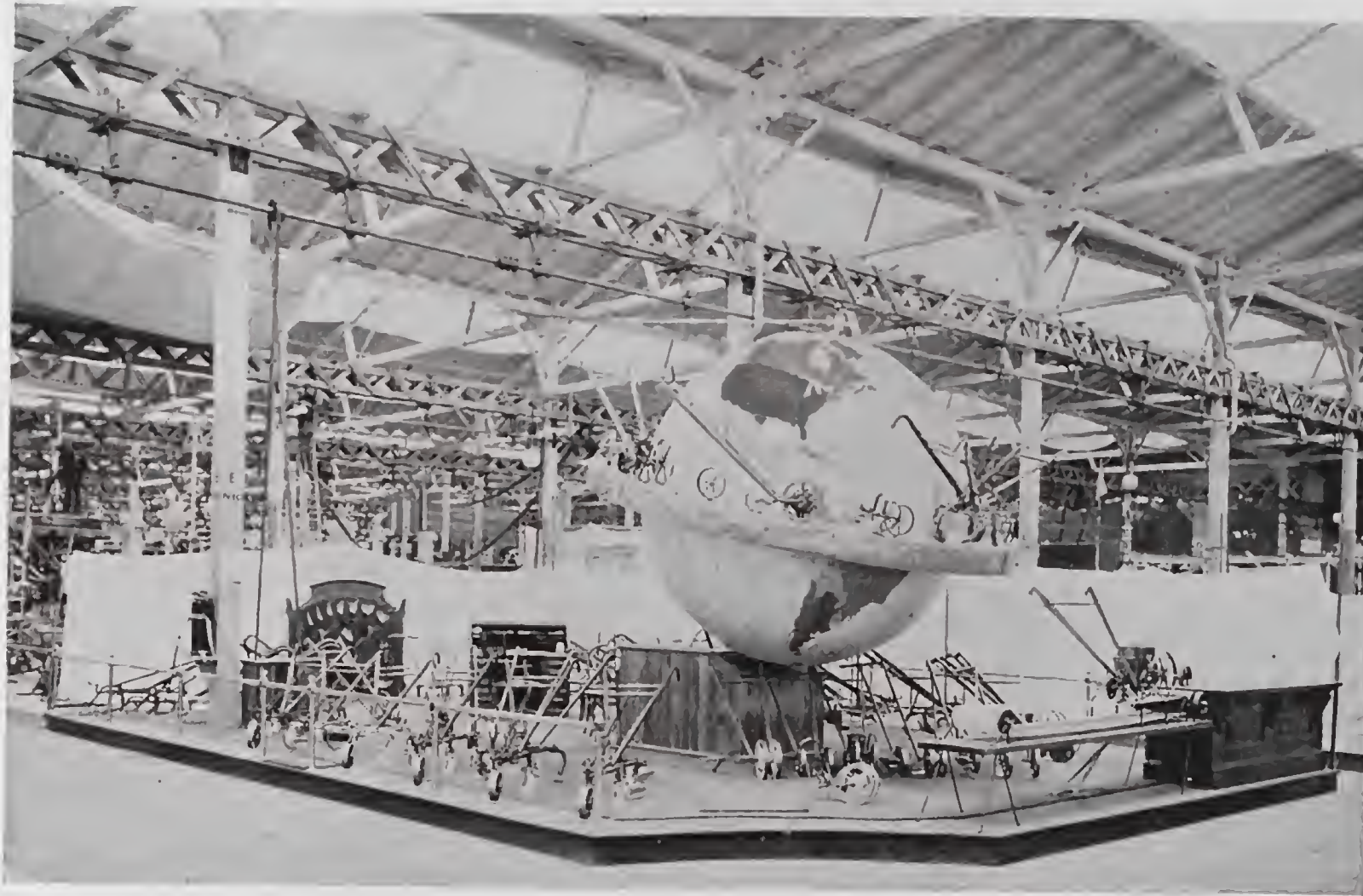
HORSE-POWER CORN SHELLER

feed cutters, mowers and drills, grain measures and baggers, straw stackers, stump extractors, hay cutters and rakes, manure spreaders, and presses for hay, straw, cotton, and fibre. There are also such special appliances as the potato planter, digger, picker, and loader, the corn and pea sheller, the rice and coffee huller, the tobacco hiller, the oat clipper, the grape and berry hoe, the horse clipper and sheep shearer.

A mere enumeration of the more prominent groups and special apparatus contained in the annex is a sufficient excuse for omitting descriptive detail.



REAPER EXHIBIT, AGRICULTURAL BUILDING

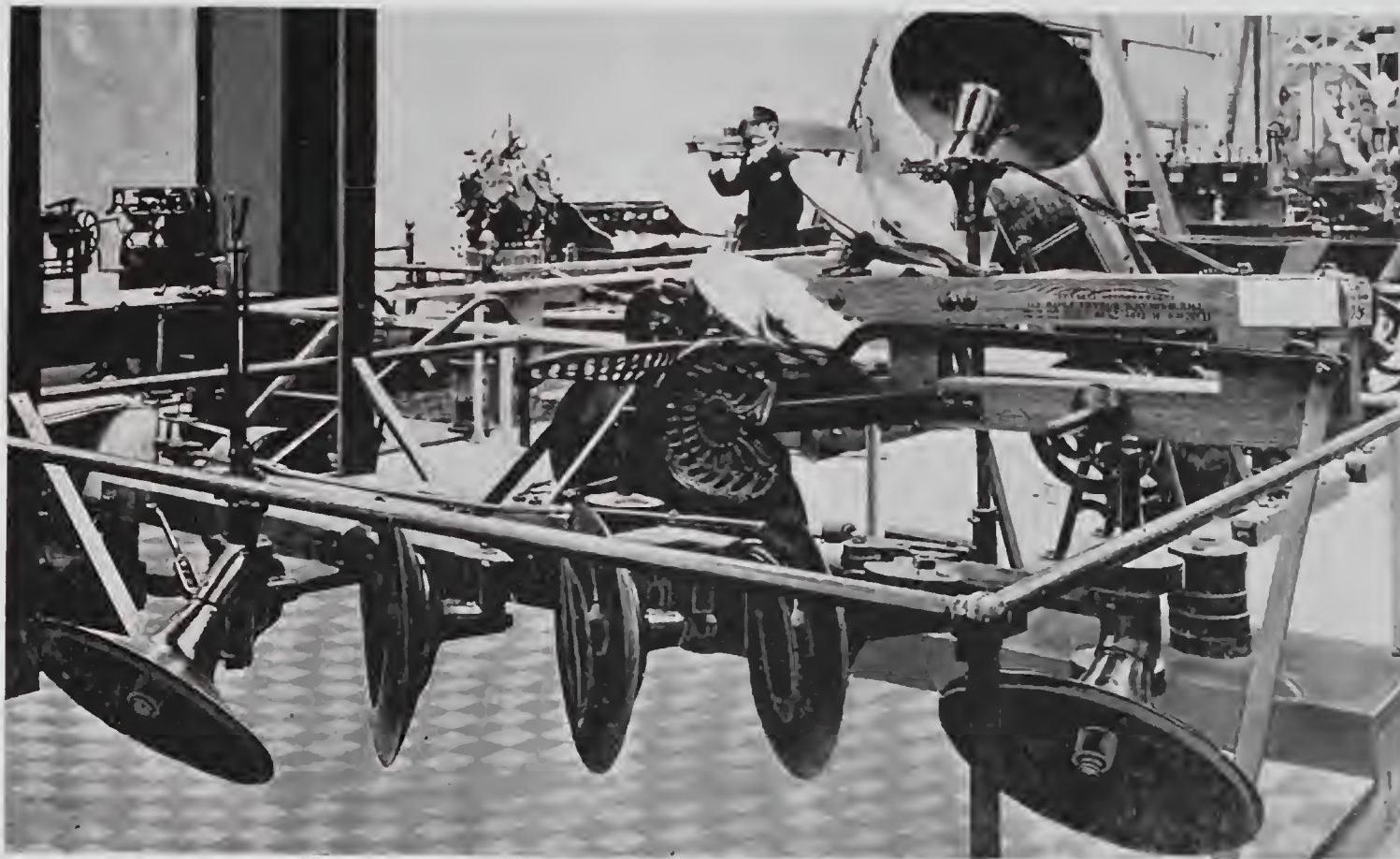


DISPLAY OF GARDEN TOOLS

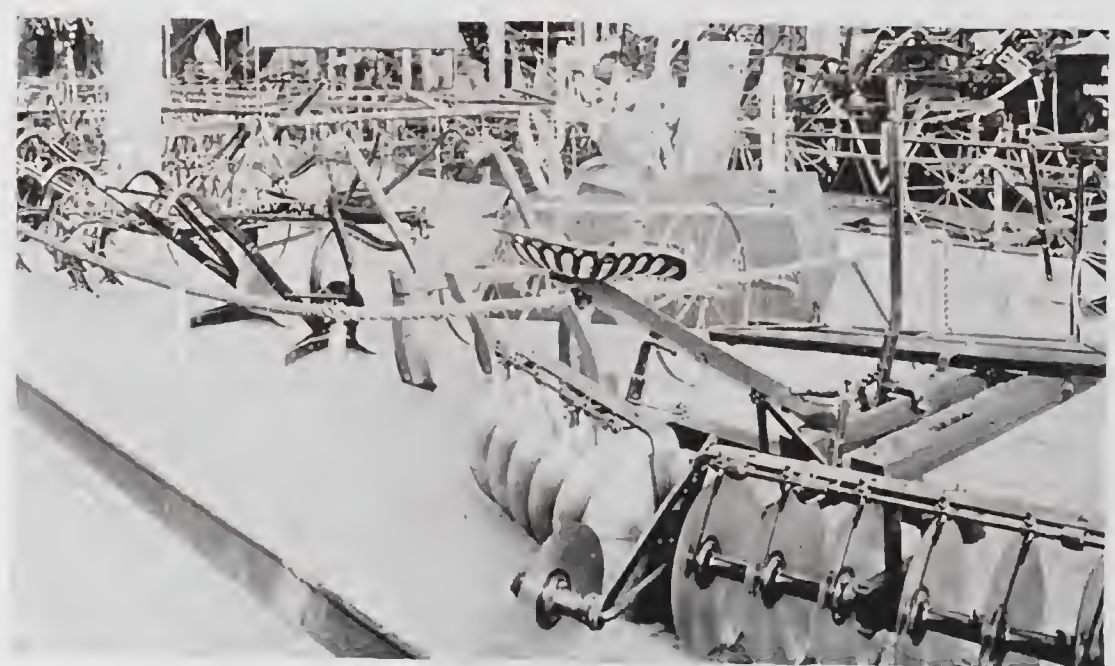
and it is almost unnecessary to say more than that the foremost of American manufacturers have placed their choicest specimens on exposition. Among the more noticeable exhibits is that of the McCormick Harvesting Machine company of Chicago, who are the largest manufacturers of their kind in the world. Their exhibits consist of harvesters, binders, mowers, and reapers, the first including rice and corn harvesters, and all of them extensively used, not only in the United States, but in foreign lands, wherever grains and grasses will grow. In the patent office exhibit of the Government department, there is a series of

models, showing the processes of development in the McCormick machine, and forming with others, a complete illustration of the progress and preëminence of the United States in the manufacture of agricultural machinery.

Side by side with the perfected mechanisms of the present day is the model of the first practical reaper invented by Cyrus H. McCormick in 1831, and in the summer of that year, worked with excellent results in a field of oats at Walnut Grove, Virginia. He was then only twenty-one years of age, but inheriting from his father, Robert McCormick, a taste and gift for invention, took up his work on the reaper after observing the failure of previous attempts made by the latter. Hence his name was deemed worthy of a place among those of the great inventors and discoverers inscribed on the frieze of Machinery hall, for in his original reaper were embodied the fundamental principles on which all reapers and harvesters have since been made.



ROTARY PLOUGHS

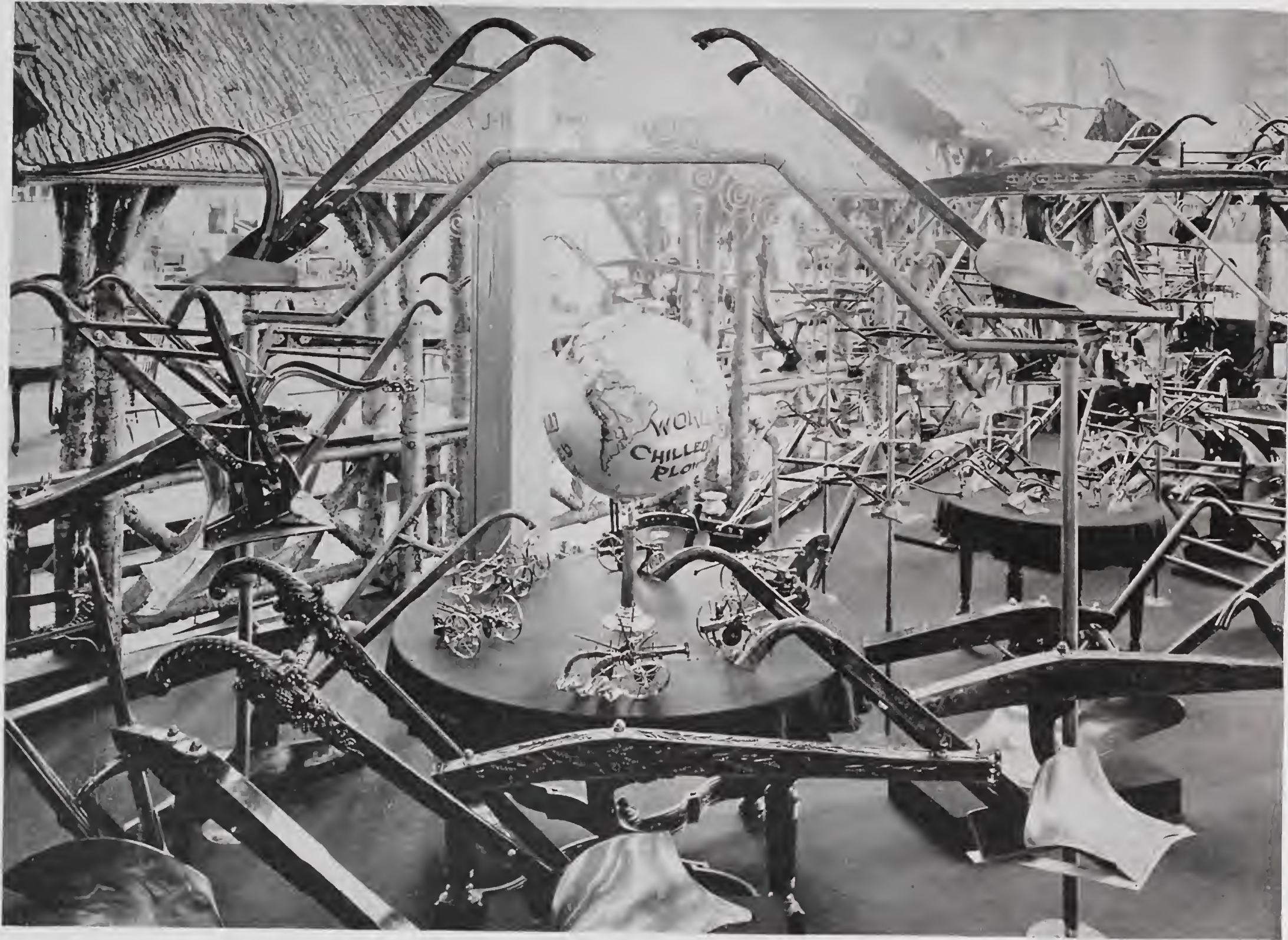


HARROWS AND PLOUGHS

An interesting feature is the panoramic illustration of the growth of the company's business. The story is depicted upon opposite sides of a screen, one showing the old fashioned blacksmith shop in Virginia, where Cyrus H. McCormick forged the iron work for his first reaping machine, and the other the Chicago works as they appeared in 1893, with their forty acres of factories, warehouses, and yards, with trains running to and fro, and vessels

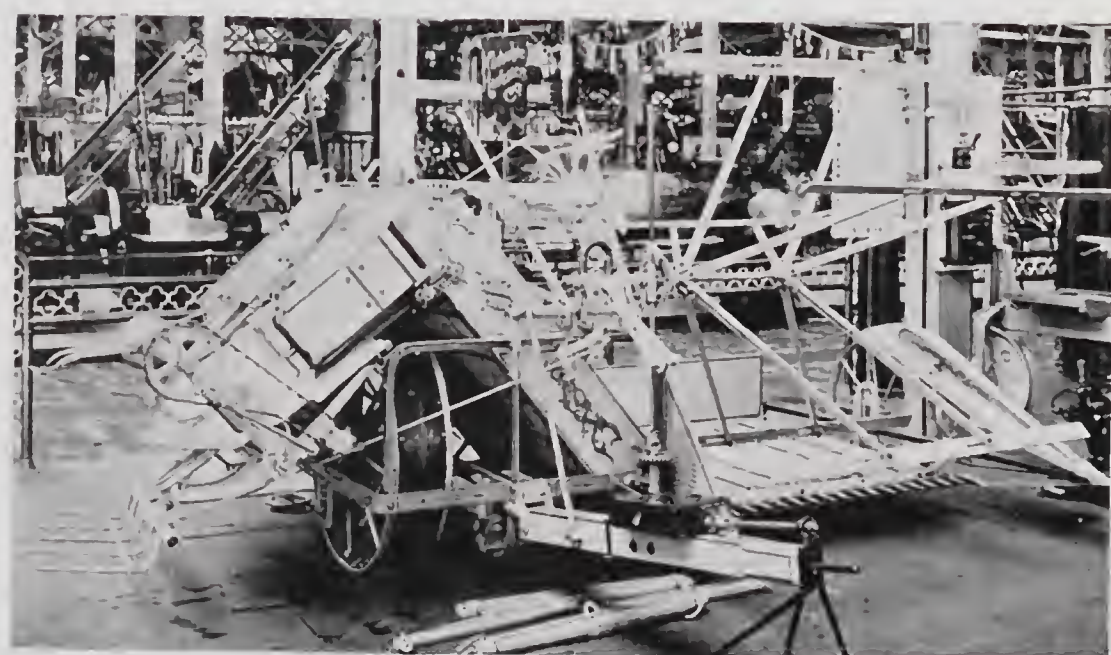


CYRUS H. McCORMICK

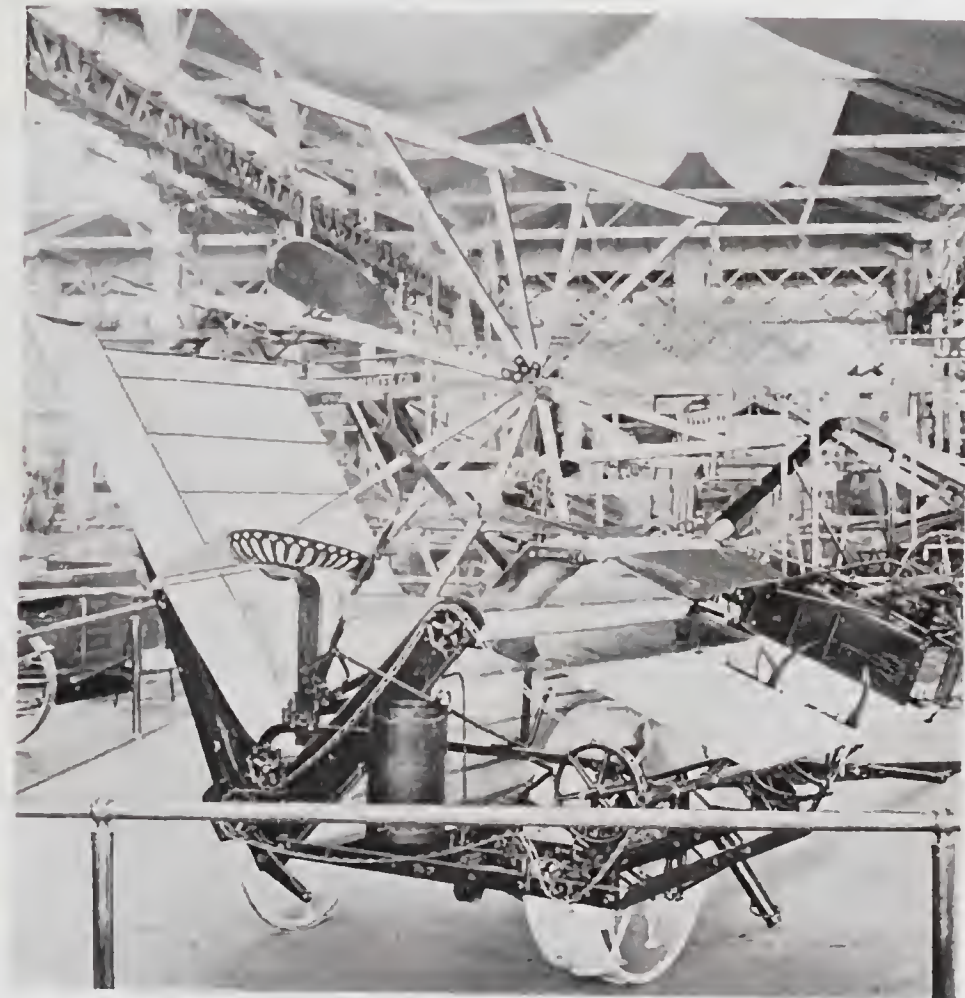


PLOW EXHIBIT

loading and unloading at the docks. Here also are the medals and other recognitions, awarded at former international expositions, beginning with the gold medal of the American institute, bestowed in 1845, and including those which were granted at the London Expositions of 1851 and 1862, the Paris Fairs of 1855, 1867, 1878, and 1889, and the Philadelphia Exposition of 1876. Especially were the merits of the McCormick reaper recognized at the London Exhibition of 1851, though still a novelty to British manufacturers and agriculturists. Even the *London Times*, which had before described it as "a cross between an Astley chariot, a wheel-barrow, and a flying machine," made amends by pronouncing it to be the most valuable article in the Exhibition, and one that of itself would almost repay its entire cost. Said the commissioner of patents in his report for 1849: "In agriculture it is, in my view, as important a labor saving device as the spinning-jenny and power loom in manufactures. It is one of those great and valuable inventions which commence a new era in the progress of improvement, and whose beneficial influence is felt in all coming time."

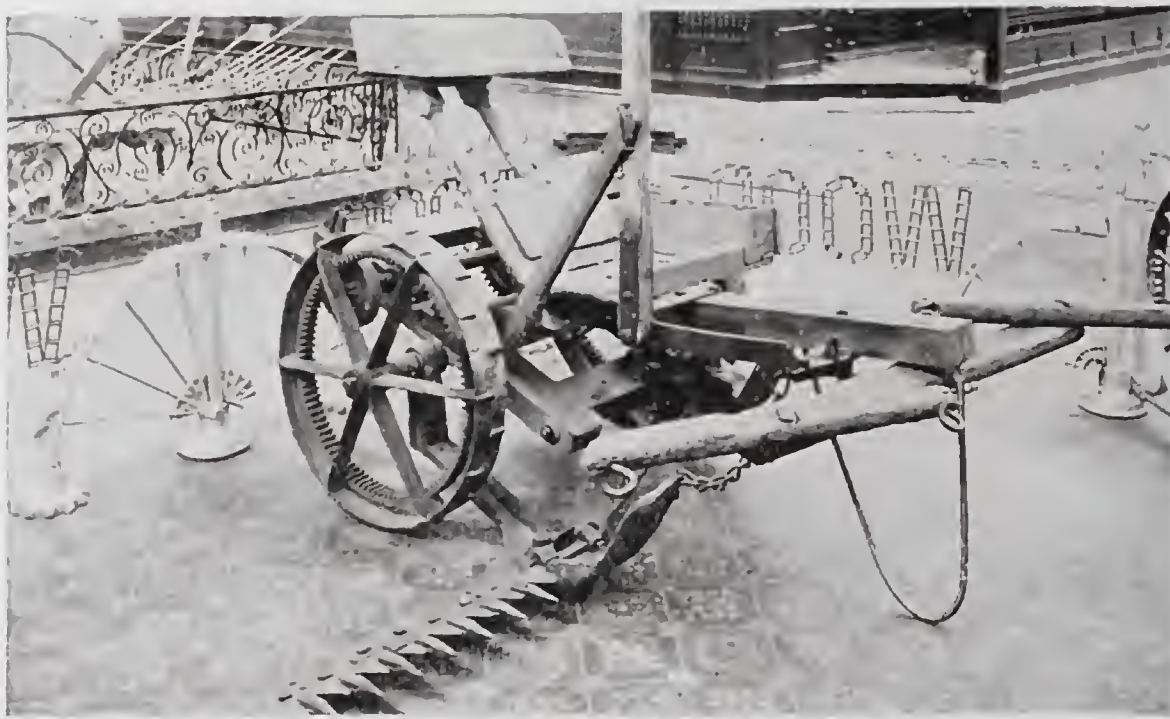


HARVESTER AND BINDER

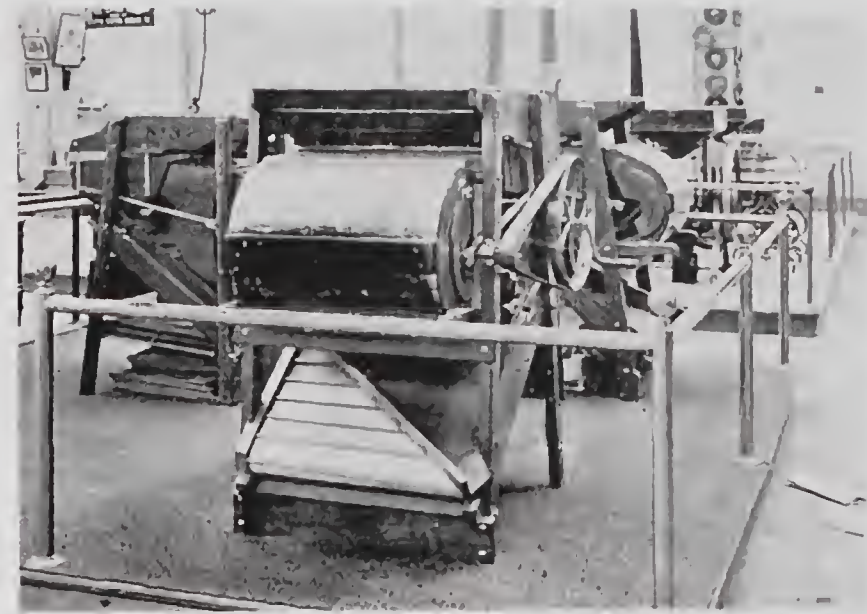


HARVESTER

The Chicago firm of William Deering and company has a creditable display of harvesting machinery, this firm claiming to be the original makers of what are termed elevator harvesters and automatic twine binders. The Oliver Chilled Plow works of South Bend, and the Moline Plow company of Illinois have each a spacious pavilion, the central figure of the latter being a mammoth bronze statue of a Dutchman, with outspread wings, typical of its Flying Dutchman sulky plough. Other establishments have also attractive headquarters, especially those which occupy a large group of pavilions of tasteful rustic design. A Philadelphia house which manufactures garden implements, groups its specialties on a platform surrounding the equatorial line of a huge revolving globe. Here are machines for sowing the seed and fertilizing



OLD FASHIONED MOWER

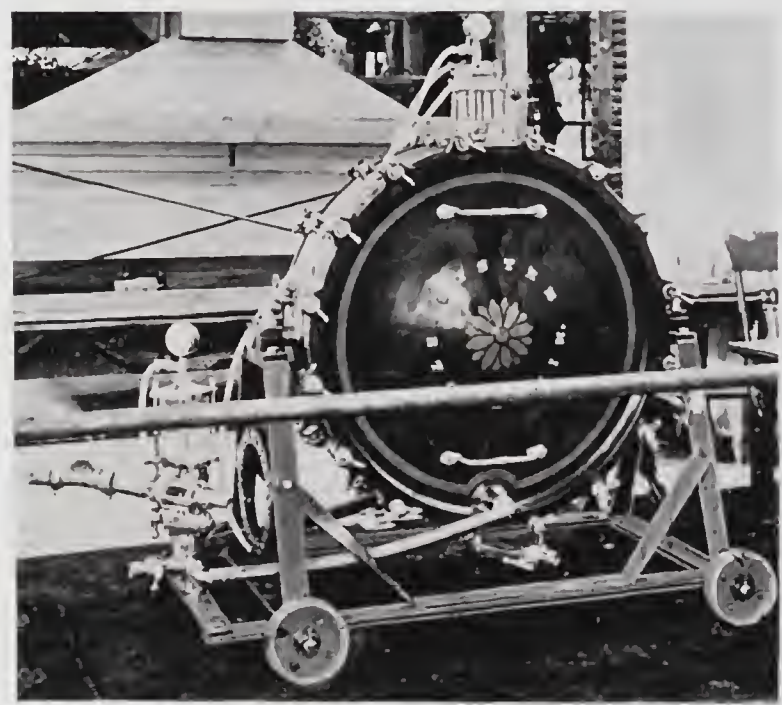


FANNING MILL

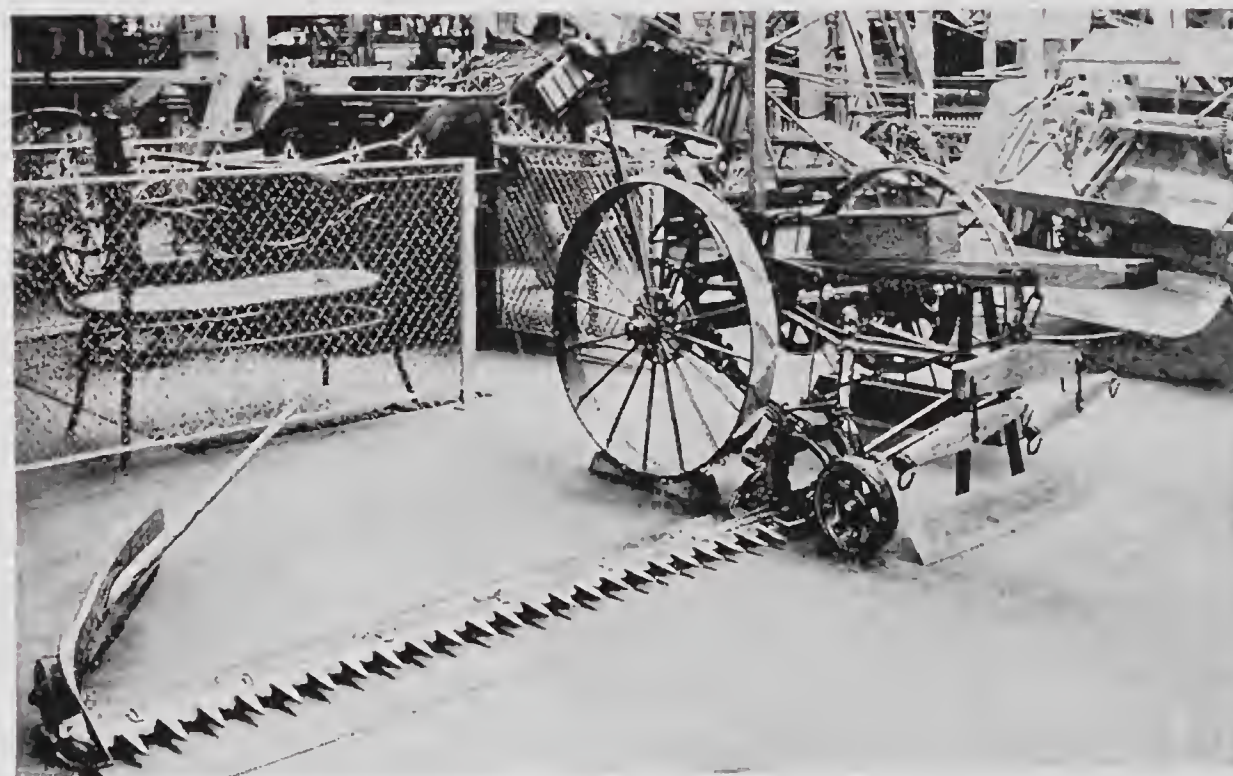
the soil simultaneously, and those which plough, hoe, cultivate, and rake at a single process. Other specialists are those which manufacture binder twine, an Auburn, New York, establishment constructing its entire pavilion of balls of this material. One of the most unique exhibits is that of the Eagle Cotton Gin company, of Bridgewater, Massachusetts, which has machinery in operation for illustrating the most improved system of freeing cotton from the seed, and preparing it for the

factory. In a model of an oil mill are displayed all the processes for extracting oil from this seed, formerly thrown away as worthless, and for grinding that which remains into fertilizing materials.

The second floor of the Agricultural building is divided transversely by two broad apertures, or light wells as they are often called, eight minor shafts running east and west between the several galleries. Collective American exhibits largely occupy this story, and first may be mentioned those of the brewers of the United States, installed in the broad aisle which skirts the western wall. There are about thirty participants, many of them with ornate and handsomely equipped pavilions, conspicuous among which are those of the Pabst Brewing company, of Milwaukee, and the Christian Moerlein brewery, of Cincinnati. The latter, neatly decorated in cream and gold, contains an array of richly costumed figures representing historic characters of many nations, with others symbolic of the four



WATER FILTER



MODERN MOWER

seasons, thus advertising the general consumption of Cincinnati beer. The Milwaukee establishment has a gilded model of its plant, on a scale of one inch to the foot, enclosed in a pavilion of terra cotta, crowned with a dome in mosaic work of stained glass. The headquarters of a Detroit company are fashioned entirely of bottles, and a Rochester brewer displays in motion a model of the machinery that makes his beer.

Occupying the entire southern gallery is the display of dairy implements and appliances, ranging from the common milk-jar and butter mould to machinery worked by steam, for the making of butter and cheese.



WINDMILL OF SALT

There are also many varieties of salt, the pavilion of a Genesee company showing in three large cases the grades best adapted to the manufacture of butter and cheese, with such as serve for table use. It is no secret that dairies use various preparations for hastening the curdling of cream, and giving color to cheese and butter. By a Copenhagen factory, with a branch at Little Falls, New York, are exhibited extracts and ferments for ripening cream, chemical coloring matters, and a collection of similar articles. In the centre of its pavilion is a large glass frame, containing the medals and prizes awarded at former expositions.

In the eastern gallery the state commissions and bee-keepers' associations have arranged an exhibit of honey and honey-comb in many forms, together with the most improved and recent apparatus used by apiarists. The exhibits of honey, whether in the comb or otherwise, are classified according to the food of the bees, including clover and basswood, white sage, buckwheat, and other varieties. Ten of the mid-continental and Pacific states, together with the province of Ontario, occupy sections in this group. New York has a collection of comb-honey weighing nearly 100 pounds, the product of a single colony at Attica. In the Nebraska case are specimens of finished workmanship in wax, in the form of cupids, angels, flowers, and fruits. Granulated honey and straw bee-hives are features in the Minnesota exhibit, and Illinois has a model of a house made entirely of wax.

Adjacent to this section, enclosed by a bamboo railing, are several Javanese huts, on the walls of which, or forming a part of them, are native musical instruments, fashioned, as are the former, of bamboo. Rice and other grains, with coffee and tea, are here displayed, the last varying in color from light green to black. There are also Batavian hats of all grades, with swords and daggers, violins, and models of a native bullock cart and of one of the suspension bridges, in the building of which across deep chasms the Javanese show remarkable ingenuity. At the back of the booth hangs a large painting representing a village such as is reproduced on the Plaisance, and with extensive rice fields stretching far away toward the horizon. It is a cheerful, sunny scene, painted by a Javanese chief, who, though he never received instruction in art, was rewarded with a place of honor in this locality.

In the north gallery, west of the dome, are cases filled with domestic wools from nearly a score of states. Ohio and Wisconsin occupy entire sections with their numerous grades, fine and coarse, long and short, combed and pulled, washed, scoured, and unwashed. A Philadelphia house has an extensive display of foreign varieties, and near by New Zealand exhibits her wealth of animal fibre.



CANE SUGAR IN GLASSES

Between the east gallery and the central court, are exhibits of flour, and such food products as canned vegetables and meats, coffee, olives, apple butter, plum puddings, soups, starch, baking powder, yeast cakes, and oats, corn-meal, and buckwheat, in the form of food preparations, together with soaps and fertilizers whose bases are potash and soda. The most extensive display in the line of cereals is by a New York factory, in whose pavilion comely damsels in Quaker costume serve cakes made of the company's preparations from Quaker oats. Another manufacturer advertises his business in the form of a rustic hut, constructed of gilded cocoa-nuts, while a soap maker erects a pyramid of his special products on a thirteen sided base, representing the original

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FERTILIZERS



EXHIBIT OF SOAP



CASTLE MADE OF TOBACCO

states, and above it a statue in soap of the woman who, as is said, was the first to fashion the stars and stripes in the form of the national emblem. Beyond is a section containing a series of photographs representing growing plants, with a row of vases containing vegetable life itself in all stages of growth, a case of crude nitrate of soda from Chile, and various fertilizers whose base consists of that compound.

In the southeastern gallery is an exhibit of the milling industries of the west, a Minneapolis company showing models of its mills, and a Duluth firm housing its miniature machinery, illustrative of the modern roller process, in a tiny mill with an old creaking wooden water wheel, the latter an exact reproduction of a factory built near Reading, Pennsylvania, a century and a half ago, and still operated by a descendant of the original owners.

The western division of the gallery is largely occupied with preparations of food and drink, comprising such articles as condensed milk, evaporated cream, chocolate, cocoa, syrups, confections, macaroni, vermicelli, starch, mineral waters, cider, rum, brandy, liqueurs, and bitters, together with crackers and biscuits, cigars, leaf tobacco, and spices. Of the exhibits of condensed milk the most prominent is that of the New York Condensed Milk company, whose first works were established at Wolcottville, Connecticut, in 1856, by Gail Borden, president of the company until his death in 1874. For the products of this company, of which H. Lee Borden, the son of its founder, is now the president, it is claimed that they stand the test of all climates, and have been used in many lands for hundreds of thousands of children. The total quantity of milk thus treated in 1892 by various establishments in the United States was 400,000,000 gallons, and far the largest among them is the one referred to. The preserved milk, also prepared by this company, and largely supplied to the army during the civil war



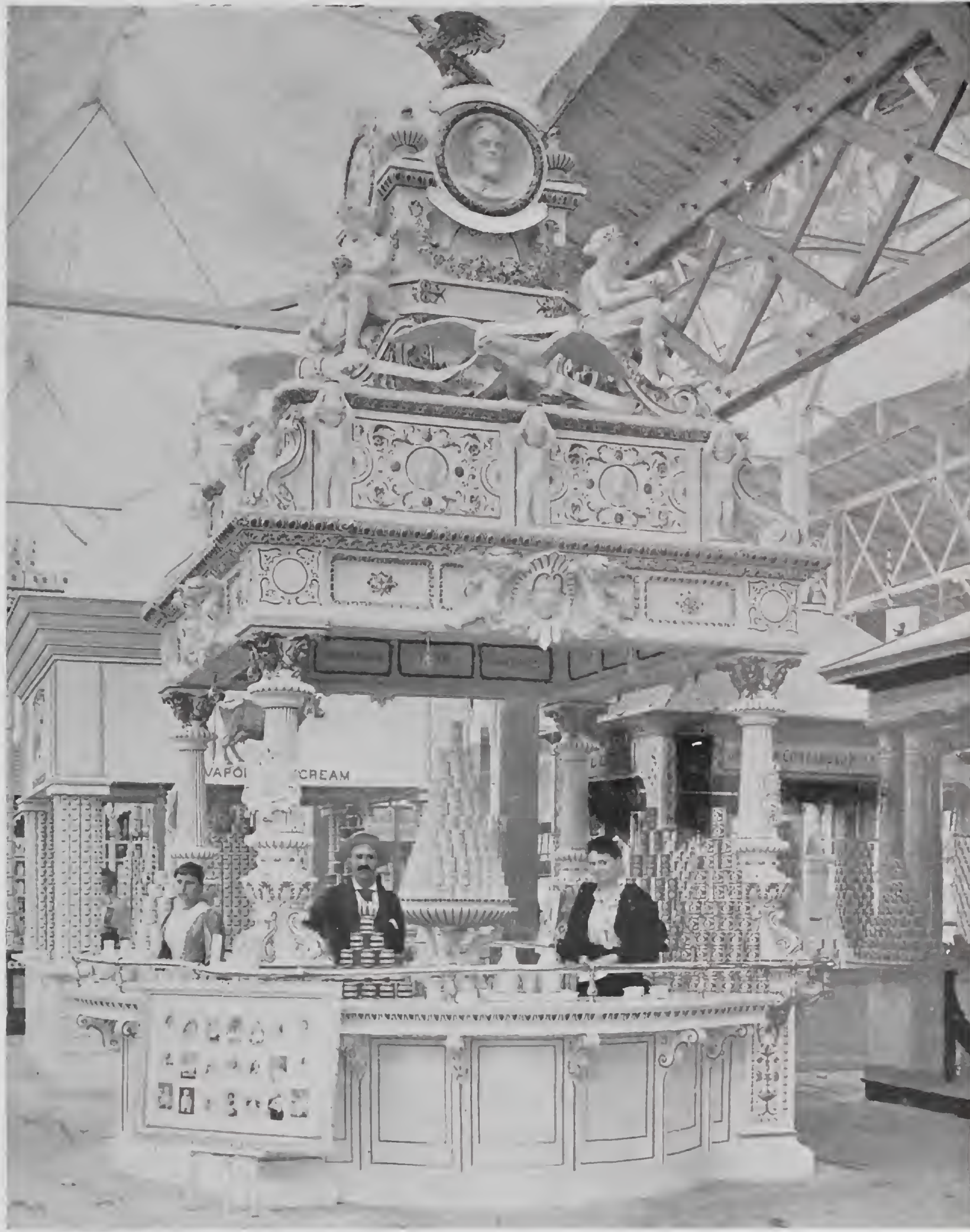
EGYPTIAN TOBACCO EXHIBIT



TABLE CONDIMENTS



CUBAN CIGARS



CONDENSED MILK

mahogany and rosewood, filled with cigars, and surmounted by a globe, above which is the historic *Pinta*.

A New Jersey firm, which manufactures the Tiger brand of tobacco, has in the centre of its exhibit a fine mounted specimen of the man-eating species, bearing in his mouth a pail of the prepared weed. Wisconsin, Connecticut, and Massachusetts have collective specimens of leaf tobacco, Connecticut's display being confined to the variety produced from Havana seed. Adjoining the group of the New England Tobacco Growers' association is a small booth in which Honduras illustrates the variety and quality of her tobaccos, both in leaf, and in the form of cigars. Among the exhibits of spices may be mentioned that of a Chicago firm, whose dealings are largely with Penang, representing in gaudy colors an ancient Malayan temple, with sections of the allspice tree, twigs of cinnamon, and other crude forms of the products in which it deals, the raw material being scattered among a varied display of manufactured articles. Finally there is a collection of syrups, suggestive of the maple groves of Vermont and Ohio.



COCOA BOOTH

is condensed by a similar method, preserved with sugar, and hermetically sealed in cans.

In the collection of mineral waters nearly all the states are represented, showing how generally such beverages are coming into use. In a large and handsome booth a New York confectioner, whose specialty is the manufacture of chocolate bon-bons, has modelled from that material heroic statues of Columbus, Venus de Milo, and Minerva. A starch company of Oswego, New York, reproduces a Grecian temple in cream, gold, and light green, whose pillars and cornices are elaborately carved by hand from solid blocks of wood. Several eastern manufacturers of crackers and biscuit have neat and tasteful pavilions, while many of the cigars and tobacco booths are of unique design, an Egyptian exhibitor advertising his wares in a temple covered with hieroglyphics, and containing miniature monoliths, pyramids, and other familiar forms of ancient architecture. There is also a pavilion built in the Corinthian style, its pillars composed of glass panels, through which may be seen varieties of smoking tobacco, while elsewhere is a case of



BREWING EXHIBIT

From agriculture in its proper sense let us turn to dairy-farming, a prominent industry in nearly all sections of the United States, where are more than 16,000,000 cows, or one to every four of her inhabitants, a larger number than is contained in Great Britain, France, and Germany combined. In 1892 the dairy products of the republic included some 35,000,000 pounds of butter, worth nearly \$5,000,000, with more than 100,000,000 pounds of cheese, valued at \$9,000,000, this apart from what is consumed by farmers, and their families and employes, which probably represents almost an equal amount.



DISPLAY OF DISTILLERY PROCESS

In the Dairy building we have one of the smallest, and yet one of the most interesting departments of the Exposition, for here is contained not only a choice and complete display of dairy products, but what has

been called a dairy school, where at intervals during the term of the Fair is held a series of tests for comparing the relative merits of various breeds of cattle. Here also are displayed in actual operation the best methods of handling milk and cream, and converting them into butter and cheese.

The structure is of simple design and neat exterior, covering somewhat less than half an acre in the southeastern portion of the grounds, near the Forestry building. Besides the offices of the department, the first floor contains the sections in which many of the states show their samples of butter and cheese, the latter also abundantly displayed in the galleries. The glass cases provided for the purpose are supplied with refrigerating apparatus, the cold air pipes banked under the floors, and against the walls. These sections occupy three sides of the hall in which machinery



LARGE BARREL MADE OF 10,500 SMALL ONES



ORNATE BREWING PAVILION



LOOKING UP THE EAST LAGOON

is in operation for the testing of milk and cream, and their manufacture into butter and cheese. This is known as the model dairy, and is well supplied with seats for the accommodation of spectators. Beneath are refrigerators and cold storage rooms for the preservation of dairy products. On the second floor is a café, which overlooks the



A STARCH EXHIBIT



IN THE GALLERY

lake, one of those secluded spots where the pilgrims of the Fair love to rest from their toil.

At a suitable distance south of the Dairy building are sheds containing 200 cows, all of which are contesting for the honors of the dairy, together with a collection of blooded calves that form an amusing exhibit. Jerseys, Guernseys, and short-horns are the chief of the rival breeds. From the time the milk is drawn from the cow until it arrives at the model dairy it is under the watchful care of scientists connected with the test committee, and representing various agricultural colleges and experiment stations, the different herds being in charge of the breeding associations, by which they have been collected from all sections of the country.

Entering the building from the east, we find the collections of Indiana, Minnesota, and Nebraska ranged along the walls as specimens of yellow butter in plain and fancy shapes. The North Star state especially has an artistic display deftly molded in the form of flowers and fruits. Nebraska, one of the most prominent dairy states of the west, has an extensive assortment, an attractive feature being the heaps of butter globules, not yet fashioned, as elsewhere, into solid, grained masses.

New York, Iowa, Illinois, Ohio, Wisconsin, and Pennsylvania are also prominent in the Dairy building, though the exhibits of some of these states,

with others of lesser note, were somewhat impaired by the partial failure of the refrigerating apparatus during the earlier days of the Exposition season. Moreover, on account of the contracted space available for the display of these products, the great dairy states were compelled to distribute their collections over the entire term of the Fair. Thus, as in the Livestock and Horticultural departments, no description written in the present tense would properly represent the case. Iowa, for instance, which ranks next to New



PATENT FLOUR



SPECIMEN EXHIBIT

York in this industry, had little to show in the month of August, while in June, September, and October scores of her creameries sent the most fragrant of their products, filling several large sections. On the other hand,



OLD COCOA MILL

bottles and in concentrated form, with the apparatus by which they exclude the air and expel gases, thus effectually destroying the germs of disease. Here for the first time this invention has been publicly exhibited in the United States, where, as is asserted, it would largely aid in the development of dairy industries, since by its use milk can be kept in good condition and in unlimited quantity, ready to be forwarded from remote regions to the great centres of consumption. Iowa, Michigan, New York, and Wisconsin have all a considerable

August showed New York and Illinois to excellent advantage, with rich saffron-yellow butter from the empire state, and cheddar and other choice brands of cheese. The Illinois exhibit was at once artistic, massive, and historic, for here were not only tubs and mounds of butter, and cheeses of generous proportions, but from Minneapolis came flowers, log huts, and mottoes of welcome, fashioned of the more plastic material, while an Elgin farmer sent the can used for the first shipment of milk to Chicago by rail in 1852. In August a strong feature of the exhibit was a select lot of Dutch cheeses from Rotterdam, and at that time Missouri and New Hampshire were well represented both in butter and cheese.

In opposite galleries of the Dairy building are small French and German exhibits, the former consisting mainly of a few cheeses, labelled genuine Roquefort, and samples of prepared milk for infants, almost identical, as is claimed, with that which nature produces, the preparation being contributed by a society which supplies the hospitals of Paris. A similar exhibit was made in the German section by a Mecklenburg company, where also Berlin inventors show milk in



CHOCOLATE PAVILION



A MOONSHINER'S CABIN

space in the galleries, stocked with cheeses.

The series of experiments and tests conducted during the term of the Exposition were watched by dairymen from every part of the world. In the first ten days of May were illustrated the best methods of handling milk and cream, followed by tests of Jerseys, Guernseys, and short-horns as to the comparative value of breeds for the production of cheese, which is manufactured by machinery in the model dairy. In the closing days of May the apparatus for cheese making was replaced by such as is used for

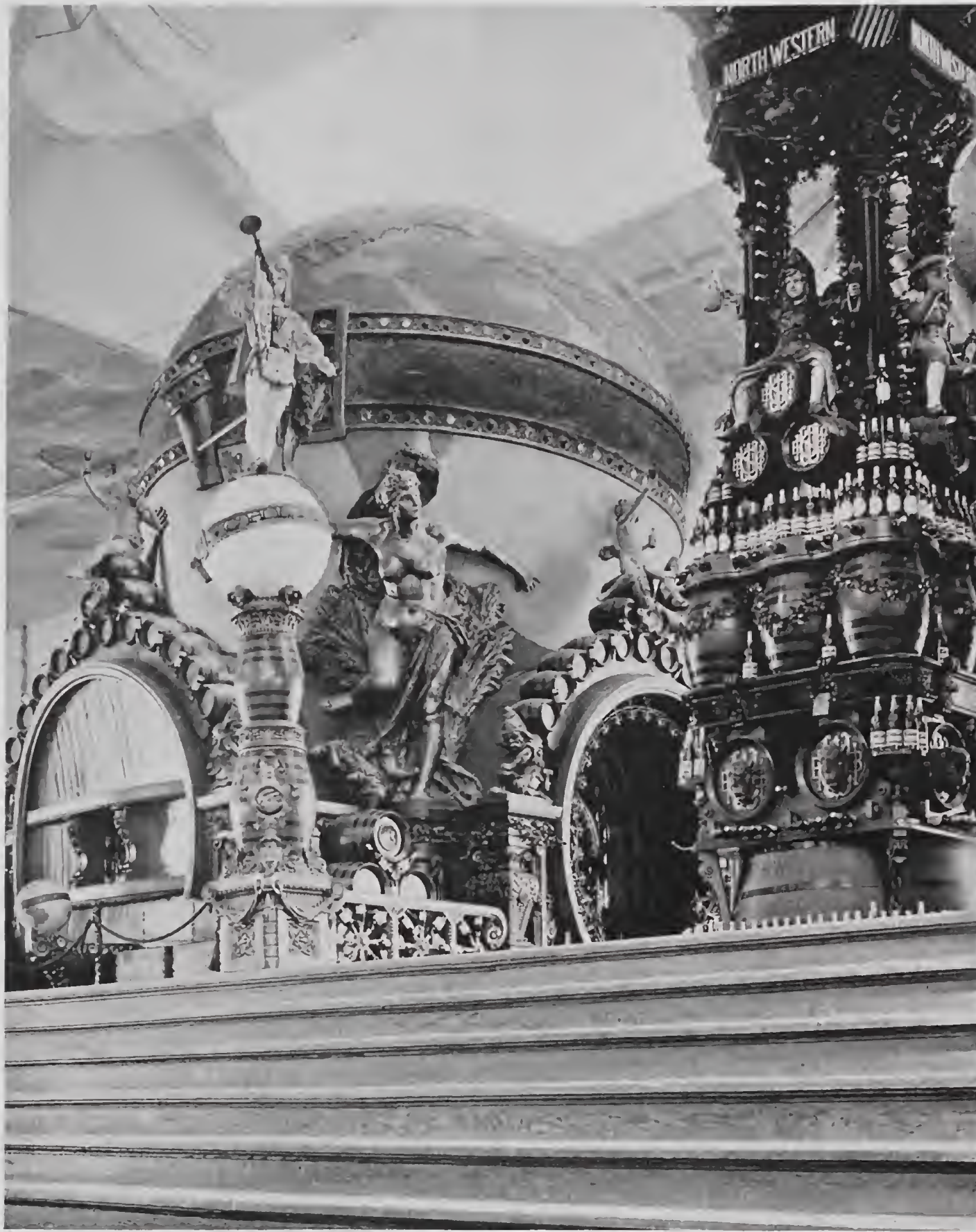
butter, with additional illustrations of modern processes for handling milk and cream. From the last of May to the close of August were compared the relative values of dairy breeds as producers of butter, with the nutritive qualities of skim milk and buttermilk, and the increase or decrease of live weight. In the following month the contest was as to butter alone, and in October there were still further illustrations of the various methods of



THE BREWERS' PAVILIONS

treating milk and cream, and of butter making, with examples of what could be done with young herds in this connection. In these experiments were represented several cattle clubs and associations which concern themselves mainly with blooded grades of stock, the Exposition management furnishing quarters and feed, and retaining the produce of the model dairy.

For the cheese test between Jerseys, Guernseys, and short-horns, twenty-five cows were selected to represent each of these breeds, the American Jersey cattle club of New York gathering its choicest specimens from no less than



DISPLAY OF WESTERN BREWERS

twenty states, and 30,000 thoroughbred animals. Among the exhibitors of Jerseys were Theodore A. Havemeyer, of New Jersey, and John Boyd, of Illinois, while Levi P. Morton sent some of his Guernseys, and in all the three breeds were many former prize winners. For several weeks before the cheese test in May, animals of each class were placed in the sheds south of the Dairy building, and from their milking records the contestants were selected. Thus it was that the Jersey milch cow, Signal's Lily Flag, valued at \$15,000, and considered the queen of her race, was not permitted to enter the lists, for though with a record of more than 1,000 pounds of butter a year, at her preliminary trial she failed to meet the expectations of her admirers. Nevertheless the result was a decided victory for the Jerseys, the herd producing during the fortnight of the test more than 13,290 pounds of milk and 1,450 of cheese, against 10,900 and 1,130 pounds respectively for the Guernseys, and 12,180 and 1,070, for the short-horns. The highest award for cheese-making was for a Jersey cow named Ida's Marigold, the property of a Buffalo bank president. As an outcome of the test, it was found that Guernseys produced cheese at smaller cost than the others.

Of the exhibits contained in the Forestry building, though officially classed with the department of Agri-

culture, mention will be made elsewhere in this work, in connection with the Horticultural display.

WORLD'S FAIR MISCELLANY.—Exposition wits tell many amusing stories of the crowds which surge toward the galleries of Agricultural hall as the lunch hour approaches, as it is generally known that a number of exhibitors distribute their specialties in food and drink for advertising purposes. A cereal company, for instance, serves out biscuits; another, cakes; a third draws root beer for the thirsty; a fourth dispenses beef extract; a fifth, a dish of gelatine, thus permitting the needy to enjoy a gratuitous bill of fare. Among the jokes that passed current as to distinguished visitors was one concerning Edison, the great electrician, who, it is said, being lost for hours to his friends during a visit to the Fair, was finally discovered in one of these galleries eagerly devouring a large pancake spread with jelly.

In the Pennsylvania section, opposite the old-fashioned fireplace mentioned in the text, is an arm-chair with heavy wooden frame covered with corn-stalk, of which, it is said, 3,000 pieces were used, the stalks being cut in thin, narrow strips, and with ornamental designs. In the chimney corners are sprays of evergreens, with birds perched among the branches. What is the exact meaning of this fireside group of feathered songsters is not explained; but, as in love and war, everything is permissible at the World's Fair.

During the term of the Fair, vegetables in season and other perishable articles would be admitted, and, when necessary, might be replaced with fresh specimens under permit from the chief of the department, who reserved the right to remove such exhibits as were not properly cared for. In September there would be a special

display of potatoes and other tuberous food-plants, and in October one of sugar-beets.

With exhibits of farm products must be forwarded, among other items, information as to the character of soil, the date of planting, and harvesting, the mode of cultivation, the yield per acre, the price at the nearest home market, and the average temperature and rainfall



EXHIBIT OF MEAT PRODUCTS

between the time of planting and gathering the crop. For other branches of this department similar regulations were framed.

Dairy products would be received only between the 1st and 10th of June, July, October, and November. In making awards prominence would be given to the flavor of butter, for which would be accredited a maximum of 45 per cent, 15 for color, 10 for packing. So with exhibits of cheese, except for slight variations. The display of butter includes



STATUARY ON AGRICULTURE BUILDING

ordinary and fancy brands, with creamery descriptions, one package only to each exhibit, and of specified weight. Exhibitors of cheese were restricted to a single specimen, limited as to weight and size. American and Canadian articles must be made of full new milk, and were generally classed as cheddars, flats, young Americas, domestic Swiss, brick, and dairy, others being subject to special regulations at the discretion of the chief of department.

To provide for a uniform and sightly display of honey and beeswax were provided the glass cases mentioned in the text at the joint expense of state commissions, bee-keepers' associations, and individuals, in proportion to the space occupied by each. Specimens of comb honey must not exceed 100 pounds, and of extracted honey and beeswax each 50 pounds. Exhibits were also invited of domestic and foreign bee culture, whether by ancient or modern appliances.

Exhibits of wool were classified as pure-bred fine, pure-bred middle, pure-bred long, and cross-bred descriptions. Entries must consist of a single fleece as taken from the sheep in its natural condition, displays of Cashmere, Angora, Alpaca and Vicuna wools being subject to the same regulations as the rest.

Among the artistic phases of the agricultural display mention should be made of the miniature models of domestic animals in one of the galleries, the originals of which were copies from life by Max Landsberg. Horses, donkeys, mules, cattle, sheep and swine, are all moulded and painted in natural colors, and with marvellous fidelity of delineation. The originals are the property of the Imperial Agricultural university of Berlin.



WINDMILLS SOUTH OF AGRICULTURE BUILDING

Not far from the shore of the south pond is a miniature house surrounded by a broad veranda, and near it a plat of ground has been laid out in sections showing strata of crushed stone, soil, macadam, and other substances, arranged in regular layers. This is the

exhibit of the National league of good roads, a young organization, but one in which substantial merchants, farmers, and others are largely interested, their efforts to secure better country roads meeting with favorable consideration from the United States department of agriculture. It was at first proposed to build a model road 1,000 feet in length, from the Forestry building to the Live-stock pavilion, but this project was abandoned in favor of the more condensed exhibit around the league's pavilion. Here sections of road are shown whose beds, varying in thickness, are constructed of macadam covered with fine stone and sand, and those whose principal material is stone. Highways are also arranged in forms best suited for wet and dry lands, for clayey or sandy soils.

By several firms to whom were granted concessions to sell confections and beverages upon the grounds, ornate pavilions were erected. Among the most elegant is that of the Lowney company, of Boston, manufacturers of chocolate bonbons, whose structure is near the Manufactures building, while the most unique is that of the Blocker cocoa company, a quaint reproduction of an ancient Amsterdam mill, located on the shore of the south pond. It was during the early portion of the present century that two brothers of the Blocker family established this business, the windmill now represented at the Fair then grinding the cocoa beans into the product which has since acquired an excellent reputation. Adjoining the mill, or rather forming a portion of it, is a Dutch house of the old style, built and furnished to illustrate the surroundings of a burgher of moderate means, and refined tastes. The furniture and pottery are essentially Dutch, and of superior quality, and there are girls who serve the cocoa dressed in the national costumes of the Netherlands as worn in early days. Very noticeable, also, among the chocolate booths is that of Menier, the French manufacturer, which, in its dress of white and gold, stands south of the entrance to the Mines and Mining building, and within the court of honor.

A picturesque display in connection with the Agricultural department is the collective exhibit of windmills, mainly by Illinois, Iowa, Ohio, Indiana, and Michigan factories, and grouped around the shores of the south pond, between the intramural road and the buildings of the French colonies.

Among the larger collections of mineral waters in the galleries of the main hall are those from Waukesha, Wisconsin, arranged in



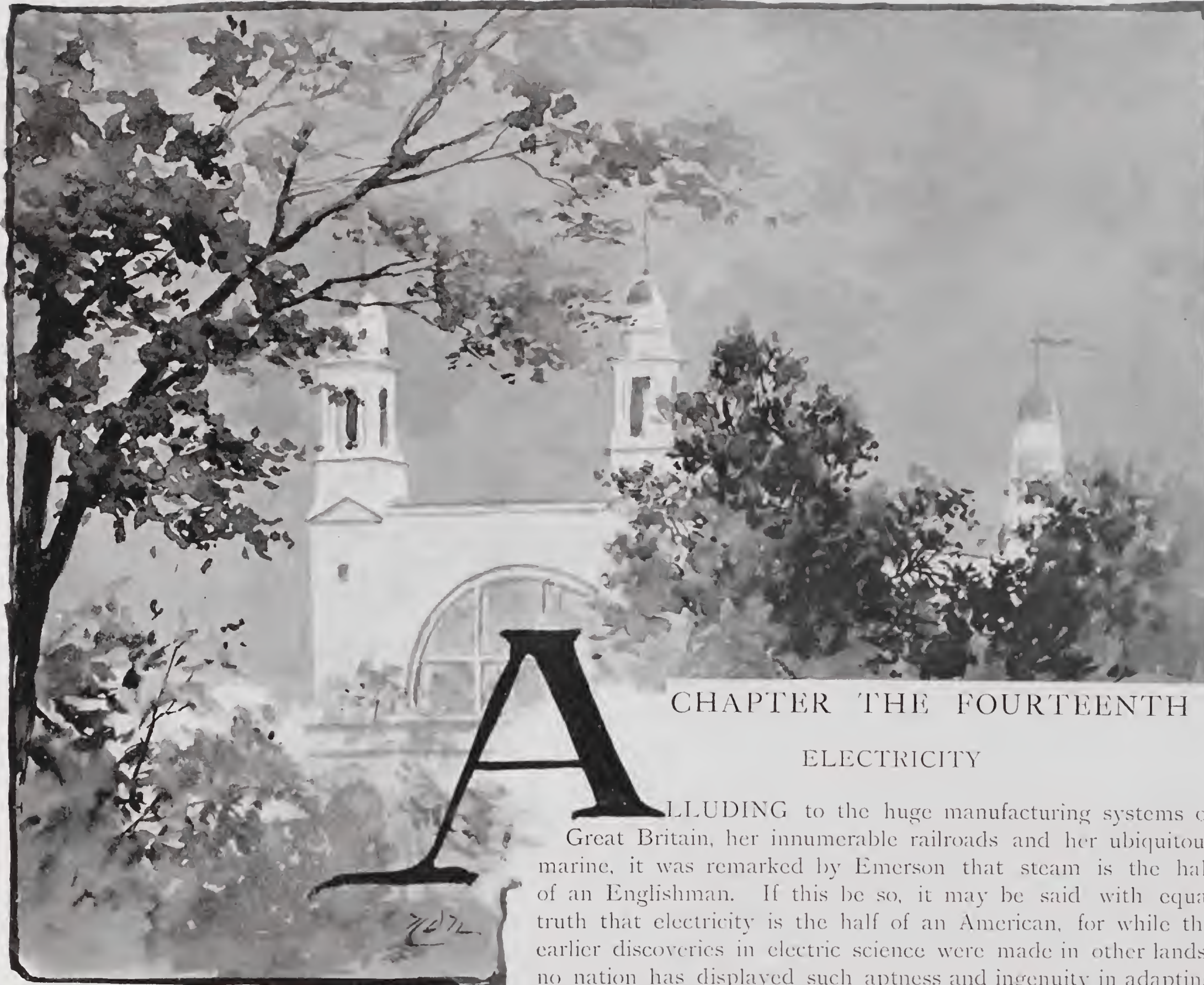
OLD-FASHIONED CANADIAN PLOUGH

the form of gigantic bottles; but the real exhibit is distributed over the entire grounds. To the Waukesha Hygeia company was awarded the concession for supplying visitors with mineral water, and for this purpose stands were erected both in grounds and buildings. The water was pumped from the source of supply in Wisconsin, and near the terminal railway station the company erected a power house and a pavilion of unique design, its main entrance in the form of a court, containing an ornamental basin, into which the water is forced, still bubbling and sparkling. Thence it is conveyed in pipes to its many points of distribution, and sold at the rate of one cent a glass.

In the rear of the Anthropological building are two unique exhibits by Louisville manufacturers of whiskies, each of whom claims to produce the real old-fashioned article by modern methods. One of these firms has erected a log hut, or moonshiner's cabin, with imitation mud plaster between its timbers, and with pieces of glass or crockery inserted as ornamental features. Inside, however, the parallel is not faithfully developed. Floors and walls are of the finest wood, and sour mash and rye are displayed in most seductive forms. The so-called Old Times distillery company has a commodious two-story distillery in actual operation, with bonded warehouse, and a United States gauger's office within. Whiskies labelled Old Times, Kentucky Comfort, Gladstone, and others, are exhibited in the room containing the stills. On a placard prominently displayed the visitor is warned not to ask too many questions on pain of having some of them unanswered.



ILLUMINATION OF THE COURT OF HONOR



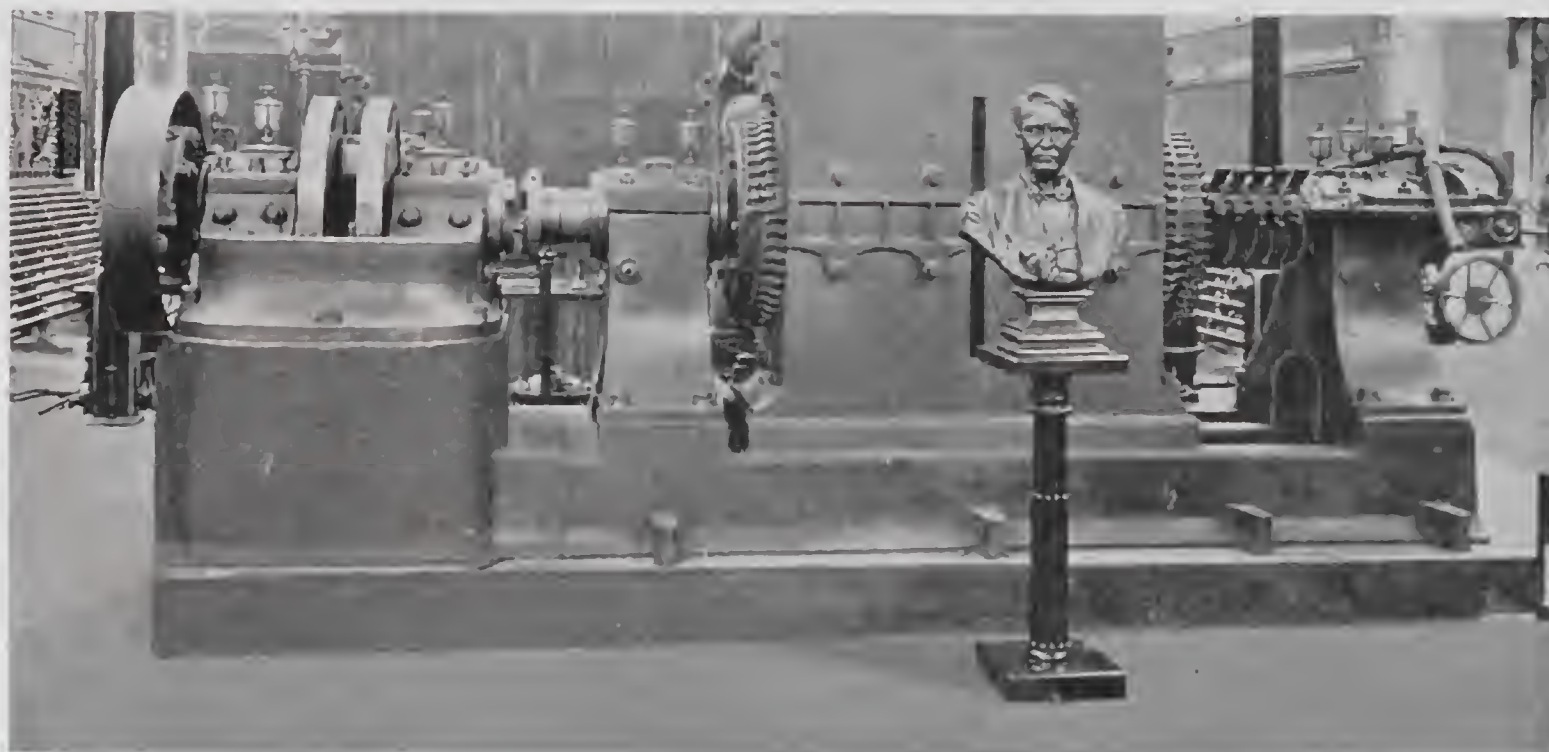
CHAPTER THE FOURTEENTH ELECTRICITY

ALLUDING to the huge manufacturing systems of Great Britain, her innumerable railroads and her ubiquitous marine, it was remarked by Emerson that steam is the half of an Englishman. If this be so, it may be said with equal truth that electricity is the half of an American, for while the earlier discoveries in electric science were made in other lands, no nation has displayed such aptness and ingenuity in adapting them to practical use. Here the patient and ill requited toil

of Samuel Morse has fructified into a network of telegraph lines, which carry the tidings of the world with the swiftness of thought to every section of the republic; here was conceived the plan for the first of our submarine cables, and here was invented the telephone, by means of which many millions of spoken words are carried daily over the wires. And so with apparatus for lighting, motion, the transmission of power, and other purposes, our electric lamps and dynamos, our motors and cars being now exported to every quarter of the earth.

And yet to-day we know no more of what electricity is than did Theophrastus or the elder Pliny, both of whom speak of the property of amber for attracting such light substances as straws and leaves. We have learned that it is not a fluid, as was formerly supposed, that it is not matter, any more than are light and heat; but when we say that it is a force, or rather the cause of a force, we have said about all that has thus far been discovered as to this the most puissant of nature's potencies. It is not until recent years that

electric power has been applied to practical purposes apart from the telegraph, or indeed was supposed to be capable of such application. In 1882, for instance, was opened the first central station for lighting streets and buildings; in 1893 there were nearly 1,300 stations with 2,500,000 lamps. In 1881 the first isolated plant was erected on the shore of Blue Mountain lake; in 1893 there were 3,500 isolated plants with 1,443,000 lights. In 1885 was built the first electric railway, with its mile or two of track;



EDISON'S APPARATUS



THOMAS A. EDISON

in 1893 there were 435 electric railways in operation, with 5,000 miles of track and 8,500 motor cars. In many steamship lines on ocean, lake, and river vessels are lighted by electricity, while in warfare, in mining, metallurgy, mechanics, and in the transmission of power for various purposes, it is rapidly coming into use. All this is fully illustrated at the Fair, where electricity is almost ubiquitous, for there is hardly a corner of the buildings or grounds where its agency is not manifest in one form or another.

To the majority of Exposition sight-seers the most attractive feature in connection with the department of Electricity is the illumination of grounds and buildings, of fountains and waterways, forming, with the play of search-lights, a more striking illustration of the wonders wrought by this science than any mere collection of machinery could possibly be. The decorative lighting of the grounds is concentrated chiefly on the main plaza, the shore line of the central basin, its border of flower beds, and the cornice lines of the buildings, rising to a uniform height above the court. The outer surface of the Administration building, with its dome and corona, are also traced in lines of light. Elsewhere exterior illumination is restricted to the Wooded island, to loggias and colonnades, to Festival hall and the terminal railway station.

As to interior illumination, the following description by the chief of the department may be of interest:



LOOKING SOUTH FROM CENTRE OF HALL

“The two problems of lighting, by far the most difficult presented, have been the lighting of the Art galleries, with their two miles of reflecting screens, and the lighting of the dome of the Administration building, which is larger by far than the dome of the capitol at Washington. On the floor of this dome, which is octagonal, there are in the eight angles as many great spreading candelabra of special and beautiful design, each bearing 50 lamps. High up, at the spring of the interior dome, is a gallery running clear around it. The gallery has a metal railing, and upon this railing are 56 seven-light standards, forming a great corona of light 120 feet in diameter. Far up above, and through the opening in the top of the false dome, is seen the beautiful painting upon the ceiling of the outer dome, as illuminated by a circle of arc lights which are themselves hidden from view between the two domes.

